American Machinist

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Editors: Kenneth H. Condit and Fred H. Colvin

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FOREWORD

LITTLE did the men who called the preliminary meeting which led to the organization of the American Society of Mechanical Engineers realize the power of the forces they were releasing.

That meeting was held in the old offices of *American Machinist* at 96 Fulton St., New York City, on February 16, 1880. Its purpose was the formation of a society that would furnish for contributors to *American Machinist*, among whom were the leading engineers and educators of the day, a forum where they could gather and discuss questions of mutual interest.

One of the engineers present at that meeting tells how the clash of conflicting opinions was stilled at the excellent dinner at the Astor House, tendered to the conferees by the publisher of *American Machinist*, Horace B. Miller. He admits that the wines were well chosen and that they did much to insure the favorable outcome.

Lycurgus B. Moore, treasurer of the American Machinist Publishing Company, was made treasurer of the new Society at the organization meeting held at Stevens Institute in April. There was some talk of making *American Machinist* the official organ of the Society, but the proposal came to nothing. The paper continued its whole-hearted support of the Society and remained free to offer constructive suggestions as a disinterested friend.

And what a marvelous development both enterprises have experienced!

The Society has grown from a group of fewer than one hundred engineers to almost twenty thousand. Today it occupies a well-deserved position of leadership in the engineering world. Its future is assured.

The growth of *American Machinist* is graphically illustrated by the two sections of the current issue. Sixteen pages in 1880, 400 pages in 1930. As for its future, there is still a job to be done, and that is all that any editor or publisher asks.

James H. McGraw

THE MACHINIST

In 1880 as in 1930, the story of the metal-working industries is the story of machines and men

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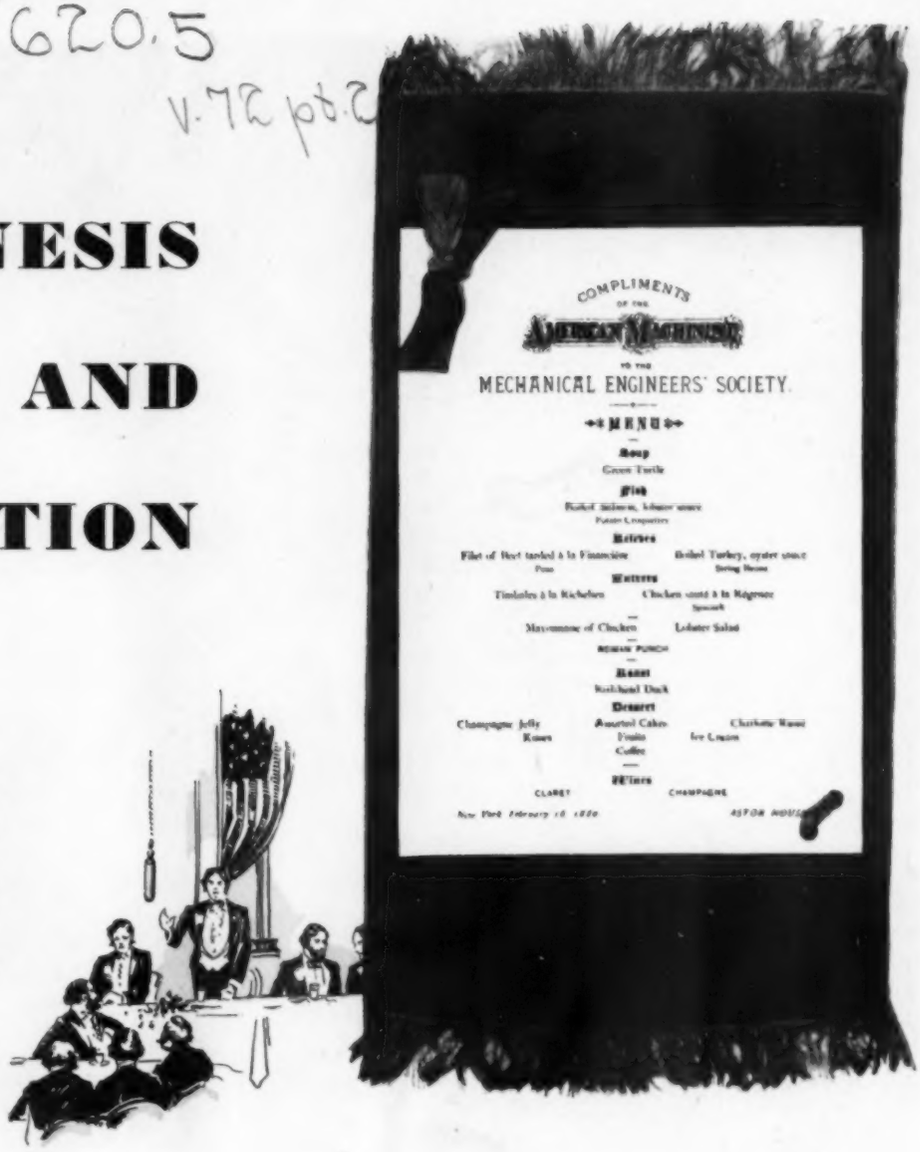
GENESIS AND EVOLUTION

A condensed history of the American Society of Mechanical Engineers wherein seventeen living past presidents of the Society report informally on their own terms in office



GRADUALLY during the earlier years of the republic, and then with a steady acceleration quickened by the growth of industry after the Civil War, the mechanical exhibits at the Philadelphia Centennial Exposition, 1876, and the graduation of scores of young engineers from the Land Grant Colleges, the profession of mechanical engineering began to come into its own. But individual engineers had neither organization nor meeting place.

During 1877, the *American Machinist* had commenced publication, and by 1879, both readers and contributors had repeatedly voiced a desire to meet each other, to compare notes, and to become better acquainted. A correspondence ensued between Prof. John E. Sweet of Cornell University and Jackson Bailey, first editor of this magazine; Professor Sweet corresponded with Alexander L. Holley and Prof. R. H. Thurston, of Stevens Institute of Technology, and during January, 1880, a letter was sent to a carefully pruned list of engineers.

January 18, 1880

Dear Sir,

It having been suggested by several prominent engineers that a national association of mechanical engineers would be desirable, and a meeting for the purpose of taking steps to organize such a society being in order, your presence is hereby requested at the office of the *American Machinist*, 96 Fulton Street, New York, the sixteenth day of February, 1880, at 1 o'clock sharp, at which time the necessary steps for organizing such an association will be made.

Any inquiries in regard to the meeting will be cheerfully answered.

Please avoid allowing this to be made public.

Very truly yours,
(Signed) John E. Sweet

Thus simply and naturally came about the historic preliminary meeting with thirty men in attendance and eighteen represented by letter. Possibly the injunction to secrecy gave birth to suspicious caution or cautious suspicion, because before the afternoon had entirely ended, certain personalities and personal interests clashed, high words followed, and the meeting threatened to "go to smash."

Horace B. Miller, first publisher of *American Machinist*, must have forseen the possibility of such an occurrence and had arranged previously to invite the entire gathering to dinner at the Astor House. Though we have no record of the felicitous words spoken, nor of the songs which must have accompanied the wines, we do know that the American Society of Mechanical

Engineers was born and was named at that six-course dinner.

Rapidly now the Society passed through the growing pains of childhood and adolescence, and on into maturity. A committee was appointed to devise the basis of organization and to formulate its rules, another committee to nominate officers. The meeting adjourned until April 7 of the same year.

MEANWHILE Mr. Holley, who was chairman of the preliminary meeting, and Professor Thurston conferred with President Henry Morton of the Stevens Institute of Technology, Hoboken, N. J. Thereupon Dr. Morton invited the new Society to hold its first general meeting in the assembly hall of the Institute. In the absence of Mr. Holley, who was ill, Henry R. Worthington took the chair, and James C. Bayles, editor of *Iron Age,* was chosen to act as secretary. Eighty persons responded to roll call, a veritable blue book of contemporary engineering.

Fortunately, the eligibility requirements were not too tightly drawn, the by-laws chosen were marked by a wise simplicity, the office of secretary was made appointive, and the presidency voted, almost providentially, to Professor Thurston. Lycurgus B. Moore, treasurer of the American Machinist Company, was elected treasurer of the Society and asked to act as secretary, without compensation, until a successor could be appointed. The meeting then adjourned, leaving to the Council of newly elected officers all details.

The founders built so sturdy a foundation that not until 1904 were the original policies of administration amended to any considerable extent. This revision introduced certain changes which Mr. Swasey covers personally on another page. From this date forward the Society was to be administered by a group of standing committees.

The first headquarters of the Society were at 96 Fulton Street, New York, the offices of *American Machinist,* since Lycurgus B. Moore had been appointed acting secretary in addition to his duties as treasurer. Offices were moved shortly afterward to 239 Broadway, New York, the offices of Henry R. Worthington, whose associate, Thomas W. Rae, was appointed the first regular secretary. In 1890, the Society moved from the downtown business district up into the old Academy of Medicine on West 31st Street. Andrew Carnegie's gift of a million and a half dollars for a building to house the four national engineering organizations—the American Society of Civil Engineers, the American Institute of Mining and Metallurgical Engineers, the American Society of Mechanical Engineers, and the American Institute of Electrical Engineers, and the Engineers' Club—made possible the move to the present address, 29 West 39th Street, in 1906. The Civil Engineers, however, did not move into the building until later. From 1883 until that time Professor Hutton of Columbia University had served continuously as part-time secretary. Simultaneously with his election to the presidency of the Society, Calvin W. Rice was appointed full-time secretary and so continues until this day. (We have tried to persuade Mr. Rice to permit us to publish his portrait, but he has declined modestly and steadfastly).

So ably and completely has Mr. Rice covered the history of the Society in the current issue of its magazine, *Mechanical Engineering,* that the reader is referred thereto for the details of its half century growth and advancement. Since some readers may not have access to *Mechanical Engineering,* we are quoting him.

"THE obligation of a natural engineering organization today is twofold: it should operate for the benefit of its members, and it should be a channel whereby some portion of the professional activities of its members is constantly flowing out into the larger life of the age.

"To understand the fifty-year development of The American Society of Mechanical Engineers toward the fulfillment of this twofold obligation, it is necessary to recall the status of mechanical engineering in 1880. the year of the Society's birth, and to realize the impossibility of meeting the second obligation adequately until, through years of existence mainly for the benefit of its members, it had helped to create a professional consciousness thereby to establish the profession (in its own estimation, at least) on a level with other professions of like worth and dignity.

"Two groups of engineers had been organized previous to 1880, but in neither of these groups, the civil-engineering nor the mining-engineering, were the meetings or *Transactions* a suitable place for the power-plant, factory, or machine-shop man. True, the World's Centennial Exposition had roused such

The trinity of the foundry—molder, metal, and tempered sand

an interest in machines that in 1877 the *American Machinist* had been established, and the machine-minded man for the first time had a clearing house for his ideas and a spot where he might find mental contact with men who were meeting problems like his. But he had no effective agency for bringing him into personal contact with other members of his profession, and no great stimulus to urge him to put the results of his work into written form for the dissemination of knowledge, the interchange of ideas, and the invaluable discussion which arises from such an interchange."

Today the machine-minded man possesses this most effective agency, the A.S.M.E.

Its presidents have been men of the soundest mechanical and scientific achievement. Some have lived their inspiring lives and gone: R. H. Thurston, 1880-1882; E. D. Leavitt, 1883; John E. Sweet, 1884; J. F. Holloway, 1885; Coleman Sellers, 1886; George H. Babcock, 1887; Horace See, 1888; Henry R. Towne, 1889; Oberlin Smith; 1890; Robert W. Hunt, 1891; Charles H. Loring, 1892; Eckley B. Coxe, 1893-1894; E. F. C. Davis, 1895; Charles E. Billings, 1895; John Fritz, 1896; Worcester R. Warner, 1897; Charles Wallace Hunt, 1898; George W. Melville, 1899; Charles H. Morgan, 1900; S. T. Wellman, 1901; Edwin Reynolds, 1902; James M. Dodge, 1903; F. W. Taylor, 1906; F. R. Hutton, 1907; M. L. Holman, 1908; Jesse M. Smith, 1909; George Westinghouse, 1910; E. D. Meier, 1911; Alex. C. Humphreys, 1912; W. F. M. Goss, 1913; and John A. Brashear, 1915.

In the monographs here following all the living past presidents continue this condensed history in their own words.

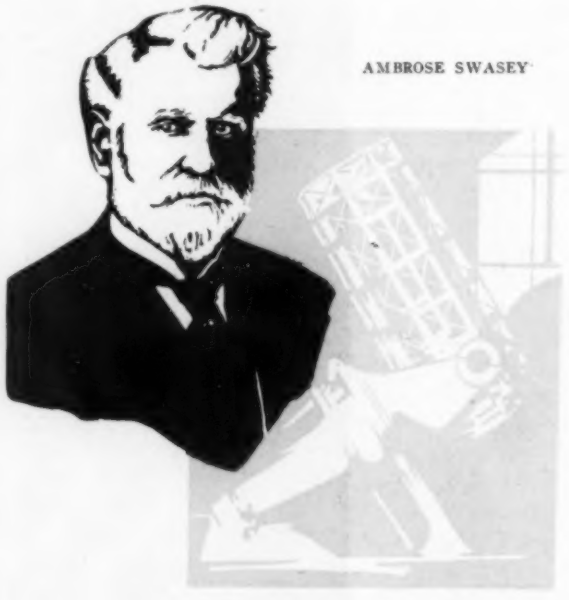
Ambrose Swasey—1904

A SERIES of noteworthy mechanical achievements were consummated during the year 1904, among them the great Hudson River Tunnel, several successful flights of the Wright brothers, the New York Rapid Transit subway using four parallel underground tracks, and the launching of the first of two turbine-propelled liners to be used in Cunard trans-Atlantic service. During that year also, a scientific journal stated that, "wireless telegraphy continued to establish itself as an act of commercial value and practicability," messages having been sent from ship to shore and also across the Atlantic successfully.

The internal combustion engine, and particularly "a motor using producer gas," was making its way into two fields where the steam engine had reigned supreme, in the generation of electricity in central stations, and in marine propulsion. The intervening years have left steam still dominant in the first of these two fields, but what will the future bring? In that year also it was announced that the Diesel engine had been developed into a form "completely satisfactory," and its manufacture was expected to be "pushed energetically."

Such was the engineering background of the year. Andrew Carnegie furnished another background which has also endured, for it was in the latter part of 1903 that he announced a gift of a million dollars for a building to house the engineering societies, and to act as a national headquarters for engineering activities. During 1904, some twenty-six architects were preparing plans for the building, which was expected to be entirely different from any constructed until that time, being a combination of a business building and a clubhouse. Buildings occupying the site on 39th Street were torn down during the year, and this seemed to emphasize the welcome news that the Society would soon be properly housed. The *Transactions* of that year contain the statement, in regard to the Annual Meeting, "The increasing size of the Society and its attendant increase in numbers made it necessary to provide for the holding of large meetings in a hall outside of the Society House. The selection fell upon the hall of the Mendelssohn Union at 113 West 40th Street." The sore need for larger quarters emphasized in that statement and in the happenings of the subsequent year was aggravated by the steady increase in membership. In 1904, United States membership of the Society numbered 2,742, foreign membership, 188. Indeed, the list of members had become so large that a resolution was passed that only the names of the members admitted during the year would be included in that year's volume of *Transactions*. Contrast that with the present membership of almost ten times that number! First efforts toward obtaining and retaining historical objects and data on the Society were made in that year.

Professor Robert Thurston, first president of the Society, whose biography was published just last year,



AMBROSE SWASEY

died late in the year 1903; adequate plans for his remembrance were a major consideration of the Society year.

Important among activities was the joint meeting of the Society and the Institute of Mechanical Engineers of Great Britain at Chicago from May 31 to June 3. Most of the engineers in attendance at the meeting were also visitors at the St. Louis Exposition which was then being held. I remember entertaining President and Mrs. Wicksteed of the British Society in the old Waldorf Hotel, where they were given the opportunity of meeting the past presidents and vice-presidents of the Society in other than a professional atmosphere.

John R. Freeman—1905

JOHN R. FREEMAN

NINETEEN hundred and five was a year of transition for the Society. The acceptance of bids for the new Engineering Societies Building made possible by Andrew Carnegie's generous gift and the actual commencement of the building during the year were the principal activities. Next, plans for a greater Society in the enlarged quarters, for additions to our library before it became included in the general library, and a multitude of kindred plans occupied our minds. Our efforts to sell the former Society House at 12 West 31st Street for $125,000 seem laughable in the light of present-day property values in New York City.

Plans for combining the libraries of the three societies which were then sponsoring the new building disclosed the fact that our library contained a total of some 9,000 volumes, and the suggestion was made that our efforts be bent towards increasing the number, in order that mechanical engineering might be properly represented in the combined library. The societies then joining us in the construction of the building were the American Institute of Electrical Engineers and the Institute of Mining Engineers. The "Metallurgical" has been added since that time, thanks to the followers of Noah Webster. The American Society of Civil Engineers offered A.S.M.E. members the privileges of their library during the year, members of our Society to have the same privileges as members of the A.S.C.E.

Our second interest during the year was fire prevention, largely as a direct result of the disastrous Iroquois Theater fire in Chicago. It was during 1905 that the Society became a member of the National Fire Protection Association.

A code of rules for the formation and operation of Local Sections of the Society was presented and accepted at the Annual Meeting during the year, the rules under which the Local Sections have come into being since that time.

Our Annual Meeting, from December 5 to 8, was held in the auditorium and reading room of the New York Edison Company at 44 West 27th Street, because the Society House had been found inadequate to take care of our huge attendance of 1,300, over 600 of them guests. The New York Edison auditorium, seating approximately 400, was found to be entirely inadequate also, which put added impetus to construction plans for the new building.

One of the sessions of our Annual Meeting was held in the dining saloon of the S.S. *Amerika* of the Hamburg-American Line, an inspection of that ocean "greyhound" following the meeting. Imagine a similar session today! It was at that meeting also that Chas. H. Haswell, first engineer-in-chief of the United States Navy, then in his 96th year, was announced as an honorary member.

Chattanooga, Tennessee, was selected for the 1906 Spring Meeting at the Annual Meeting, and plans were laid to take care of the record attendance expected.

At that time, the Society boasted a membership of something like 2,915 and was still able to publish the names of new members each year in the *Transactions*. As I remember it, our Secretary received a princely stipend of $3,600 for his services each year in those days, a sum which we considered entirely adequate for his needs.

Our sessions at the Spring Meeting, Scranton, Pa., were held in the mornings and evenings, the afternoons being devoted to inspection trips to various industries of Scranton and surrounding communities. The ladies were escorted through various textile mills and other industries of supposed interest to them, and were also taken for scenic trips in the vicinity of the city.

1905 to 1914

THE EIGHT presidents holding office between 1906 and 1914 have ended their earthly labors and are not with us to celebrate the golden anniversary of the Society. During the period a large number of formative changes were consummated, in such fashion indeed that they have remained as monuments to the men who conceived and executed them.

Predominant in the year 1906 was the moving of the headquarters of the Society to the just-completed Engineering Societies Building, and the taking of office by Calvin W. Rice as Secretary. The change to new and larger quarters necessitated a study of office routine and practice and was an incentive toward federation of the engineering libraries. The following year saw the end of the Mechanical Engineers' Library Association, the sale of its real estate, and the transfer of its assets to the Society. The Gas Power Section and its sedulous activities were begun in 1908. The year 1909 was memorable for the effort to emphasize the philosophy of Society management and control by standing committees, and the adjustments of the inter-relations among these committees. The first local meetings other than those in New York City, development of Student Branches, and several constitutional changes are also worthy of mention. The following year brought the trip to Birmingham, England, by invitation of the Institution of Mechanical Engineers, and the Society's objection to a legislative bill which would require licenses for practicing engineers.

A committee to formulate standard specifications for the construction of steam boilers and other pressure

Direct descendant of Vulcan, first artificer of metals— the blacksmith of all ages

from vessels was appointed in 1911, and first actual steps toward affiliation with other engineering societies were taken. The Providence Association of Mechanical Engineers affiliated with the Society during that year. During 1912 much attention was paid to a revision in Council of the existing Constitution and By-Laws, to codify the relations of the sections of the Society, both professionally and geographically, and to simplify the statement of standard procedure under the By-Laws. Student Branches were fostered and developed during the year. Exchanges of international courtesies, particularly with Germany, in 1912, led to the visit of an organized party of the Society to the industrial and historical cities of Germany in 1913, by invitation of the Verein Deutscher Ingenieure.

At this point, Mr. Hartness takes up the story.

James Hartness—1914

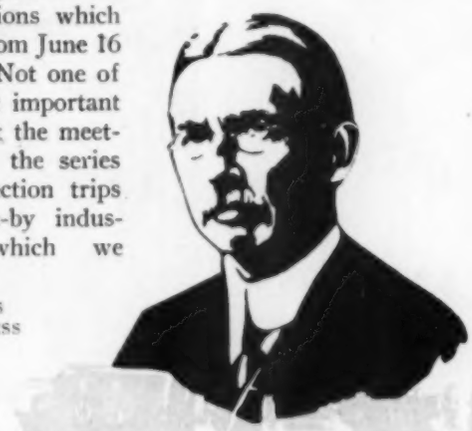
ALTHOUGH the World War began in August, it was not really brought home to the A.S.M.E. at that time. Though it was destined to embroil practically all the nations of Europe, and had done so by the end of the year, we expected it to be of short duration, just another of the perpetual series of European wars which would affect us very little. We were interested mainly in bettering and extending the co-operative work among the Founder Societies which was just beginning to assume importance. Our co-operative work with them was perhaps the keynote of the entire year's work.

The first real interchange of information between the societies occurred during that year, the result of our reasoning for some time that duplication of effort by several organizations was in many cases unnecessary and wasteful. Consequently, when we found an opportunity to assist our sister organizations we did so and they reciprocated by assisting us in ever-increasing measure. That was a forerunner of the co-operative efforts of the societies of today. The first exchange of library references and the consequent realization of the library resources of the other Founder Societies was, of course, a natural result. These first hesitant efforts to work together for mutual benefit were progenitors of the efficient Engineering Societies Library, the Engineering Foundation (founded in 1914 through a gift by Ambrose Swasey), the American Standards Association, and similar co-operative effort of the present day. And that was in the day when trade secrets were items still potent, when a manufacturer was afraid to share information and the results of research with a competitive manufacturer, in the belief that it "hurt business!"

During that year we began the work on standardization of piping for sprinkler apparatus with the National Board of Fire Underwriters, work which resulted in the satisfactory standards which are in use at the present time. Modification of the Briggs Standard pipe thread was also undertaken in co-operation with the American Society for Testing Materials.

A considerable amount of other standardization work was undertaken during the year, although I do not question that our efforts would suffer by comparison with the present accomplishments in standardization which have been the direct results of public realization of the values of standards. But it must be remembered that we were pioneers in those days! Some of the standardizing work which we followed actively was that on flanges, boilers, threads for fixtures and fittings, safety valves, and filters, plus further work on the Power Test Code. I was personally much interested in the work on screw-thread dimensions which was undertaken, as well as that regarding changes in the patent laws.

The Code of Ethics, upon which we had been working for several years, was presented for the acceptance of the membership at the Spring Meeting, held that year in St. Paul-Minneapolis. More than 500 persons were registered for the sessions which lasted from June 16 to 19. Not one of the least important things at the meeting was the series of inspection trips to close-by industries which we made. The annual meeting was held in December, as usual, with an attendance of 1,400 members and guests, a record at that time. The Society membership for the year was 6,142, an increase of 1,004 during the year, an increase of which we were proud. That year also three new student branches were added to the rolls.

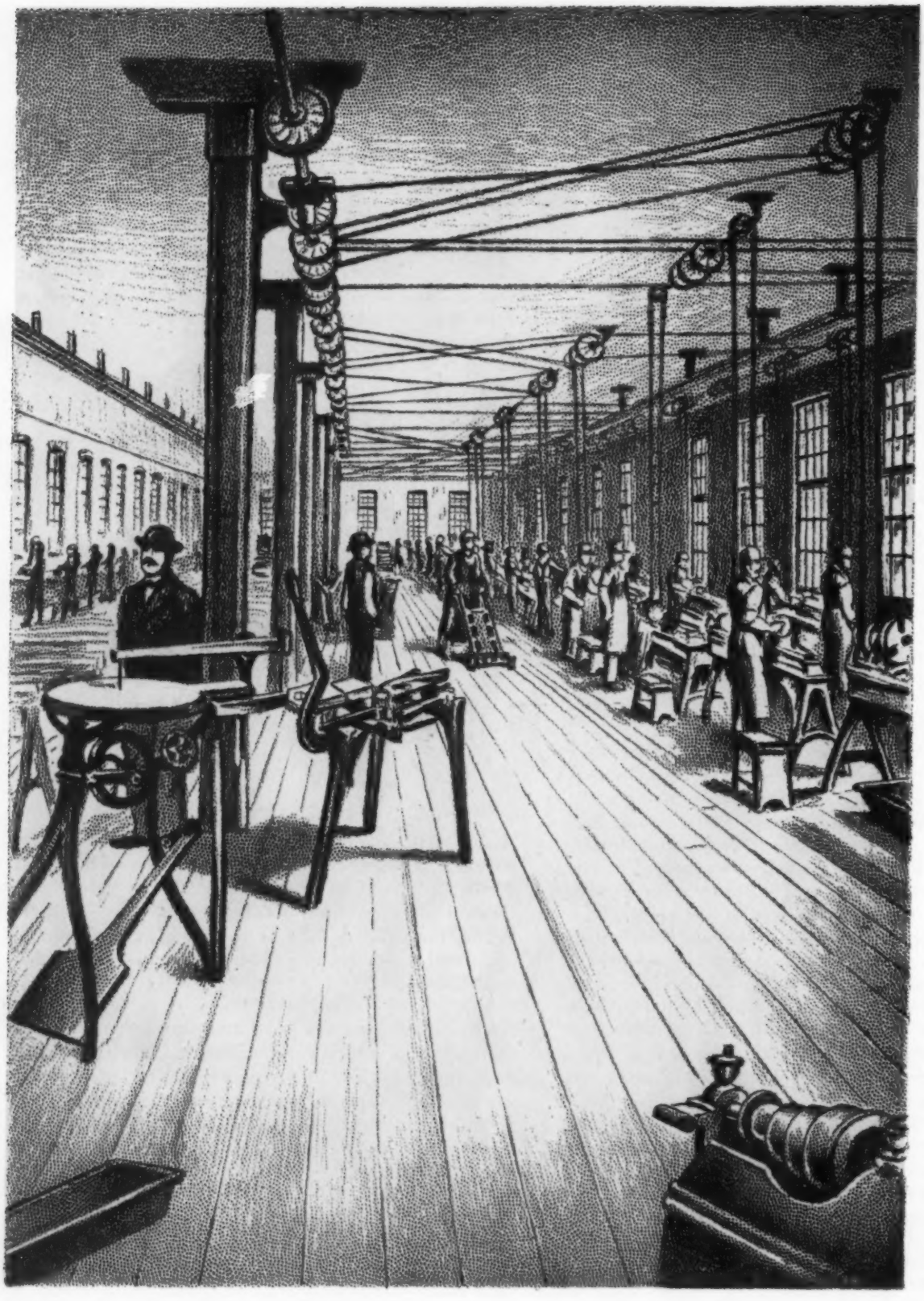


JAMES HARTNESS

One of our major activities also was preparatory work for the International Engineering Congress and the Pan-American Scientific Congress, which was to be held in October of 1915; for we fondly believed that the European situation would be smoothed over in time for it to be held without trouble or annoyance!

The Year 1915

AMBROSE SWASEY'S gift of $200,000 toward an Engineering Foundation was announced at the opening of the year 1915, and consequently much of the year's time and effort was devoted to its organization. In a quandary regarding the status of Society members who were residents in countries then at war, the Council took action to continue their names on the roll indefinitely. E. D. Leavitt was elected to honorary membership, a Local Section was established at Worcester, and a Local Sections Committee appointed. The Spring Meeting was held at Buffalo from June 22 to 25, with 424 registered. A general meeting was held at San Francisco on September 16 and 17, just prior



THE MACHINE SHOP

Whatever may be devised, the machine shop is always ready to make it

to the International Engineering Congress, which convened on September 20. The Annual Meeting was held from December 7 to 10, with a record attendance of 1,437, of which 819 were members. A memorial meeting to Dr. Frederick W. Taylor, who had died during the year, constituted one of the sessions.

Dr. D. S. Jacobus—1916

THE threat of the World War dominated the thought of the members and those directing the activities of the Society in 1916. President Wilson's policy of "watchful waiting" began to evolve into a policy of preparedness. The Naval Consulting Board, engineering advisory committees, military lectures, all took form and became living realities. Our Society worked hand in hand with our sister Founder Societies for our government and for national service. Thus the real position and importance of the professional engineer won public notice and acceptance. It had been taken for granted previously as part of the progress of civilization. National recognition was accorded the engineering profession in the invitation extended to the Societies by the Secretary of the Navy of the United States to nominate the members of the Naval Consulting Board. Society members constituted ten of the twenty-three men on the Board, although only two were official representatives of the A.S.M.E. In January, 1916, the engineers received a second recognition in a letter from President Wilson.

The Committee on Industrial Preparedness, a subcommittee of the Naval Consulting Board, was formed during 1916. In response to an invitation from General Wood, Commander of the Department of the East, a joint committee was chosen to facilitate the carrying out of the organization of a Civilian Engineer Reserve Corps as a part of the military forces of the United States. This committee made its first report back in 1915, and in July 1916, Congress provided a means by which civilian engineers became a part of the military forces of the United States. Later this committee financed directly the recruiting of a corps of men which were sent to France. Lectures on preparedness and military subjects given at the Engineering Societies Building under the auspices of the Founder Societies drew an attendance of 3,000.

Internal affairs of the Society were of course affected by the warlike atmosphere, and most of our activities related to the movement for preparedness or some other phase of military preparation. However, within the Society's personal activities the nominating committee was appointed by the President in a way to secure the greatest possible democracy in selecting nominess for executive offices. The Sections of the Society were divided into five geographical groups and one member of the committee was chosen from each group. This was done in an informal way since there was nothing in the Constitution or By-Laws at that time to provide for such a procedure. Previously the nominating committee had been nominated by the President in office. The precedent established during this year has now become standard practice.

The Spring Meeting was held in New Orleans, with a total attendance of 485, of whom 114 were members. The local associations, the local membership of the American Society of Civil Engineers, and the Louisiana Engineering Society acted jointly as our hosts.

Our Annual Meeting was held from December 7 to 10, with a record attendance of 1,437, members registered numbering 819. Fourteen local sections were represented by delegates, and there were members present from every section of the country. Ambrose Swasey was made an honorary member at that meeting: Prof. John E. Sweet had died during the year, and a memorial service was held in his honor. His work as one of the organizers of the Society will never be forgotten. Professor Sweet was made Honorary Member of this Society in 1904, and on his death, Honorary

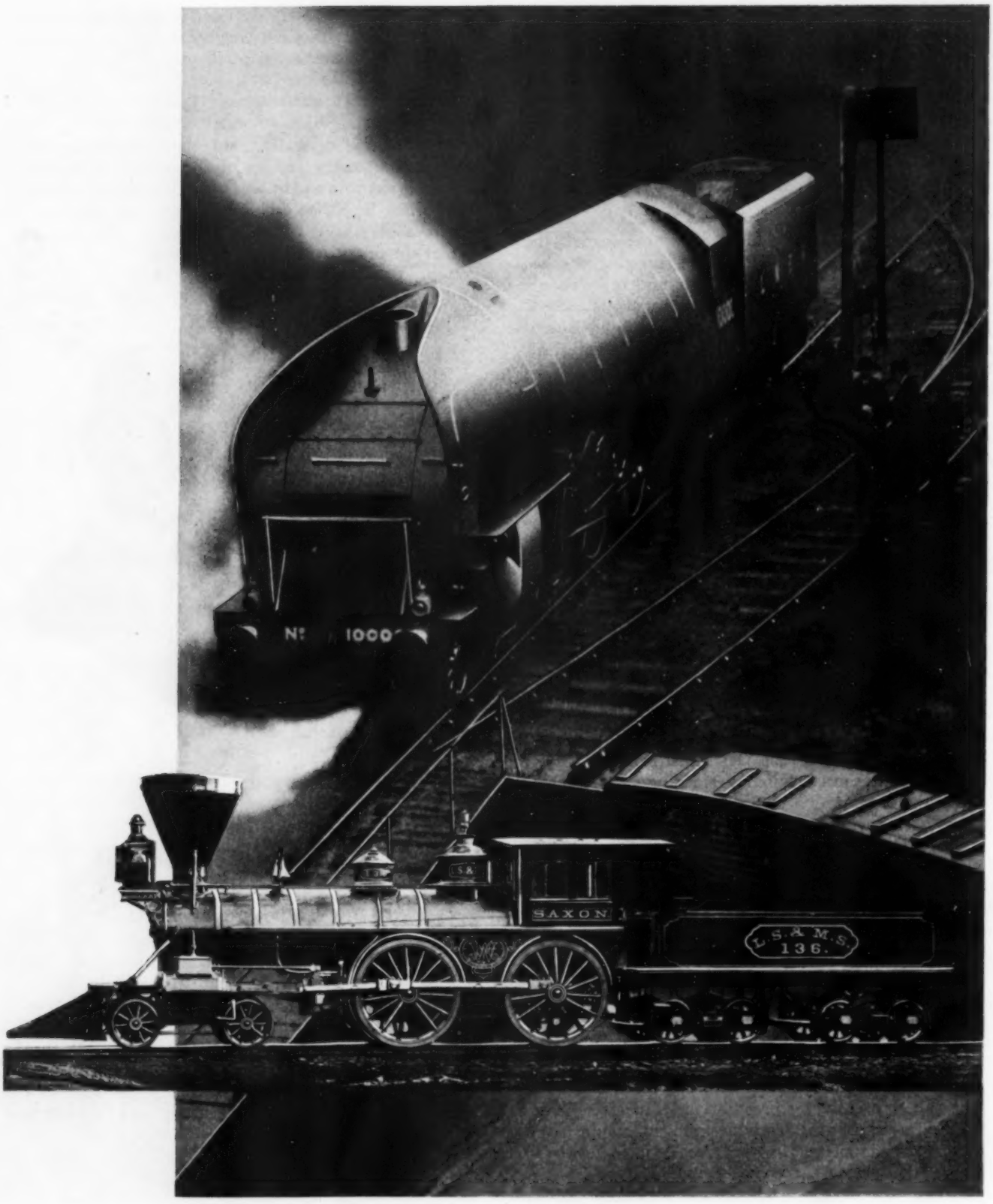
DR. D. S. JACOBUS

Member in Perpetuity. For the first time in the history of the Society a joint meeting of the Student Branches was held at the headquarters of the Society. Two hundred fifty undergraduates and members of the faculties of the various colleges were in attendance, representing five Student Branches.

Dr. Ira N. Hollis—1917

"BROTHERHOOD of all engineers and their united action in any service that will be for the good of our country," a favorite motto of mine, seems to express best the attitude of the Society in 1917, the year of the entry of the United States into the World War. Inevitably, many of our activities related to problems with which engineers are concerned in the prosecution of any war. At the beginning of the war, the Society in common with many others had tendered its services to the President of the United States, an offer which was promptly accepted. Individually, also, members heeded the call and served in almost every department of the government.

One of the first and most successful undertakings of the year was that of the Engineering Resources Committee, which furnished specialists for the numerous demands of the government and the industries generally. Our circular letter to our 8,700 members brought in over 6,000 replies, all of which were collated and indexed in a manner which enabled the Society to furnish names, literally by the hundred, in response to requests for experts in varied lines of industry.



MISTRESSES OF THE RAILS

American and European railway design keep pace with the demands of progress

A very early undertaking was the formation of the Military Engineering Committee by the Engineers' Club of New York, to arouse engineers to the need for preparedness, and to instruct them in military tactics. The A.S.M.E. with the three other Founder Societies, participated in the committee work, which resulted in a great preparedness parade in which ten thousand engineers marched, the recruiting of some 1,300 men, and a number of other activities. The Society also took up energetically at the Spring Meeting in Cincinnati, May 21 to 24, the matter of standardization of gages, a work which helped in the passing of regulations by the government. A number of other committees were also formed during the year to assist in preparedness and defense work.

DR. IRA N. HOLLIS

Other activities co-operating with the government were recognized in a Gage Committee to develop a central bureau for the certification of gages. A public hearing was called in 1917 for the purpose of considering in a broad, patriotic way what could be done to accelerate the manufacture of munitions.

Another important development of the year was the organization of the Engineering Council, an outgrowth of a real need for united action for proper consideration of questions of general interest to engineers and to the public. At that time, the Council was concerned with only the four National Societies.

During that year, the American Society of Civil Engineers moved into the Engineering Societies Building, bringing together under one roof the headquarters of the four national engineering societies, realizing the vision and hope of Andrew Carnegie, the donor and founder of the Engineering Societies Building.

Industrial Valuation had been chosen as the general theme for the keynote session of the annual meeting in December, 1916. As the Spring Meeting of 1917 came shortly after the declaration of war the committee felt that the most timely subject was the Manufacture of Munitions. The attendance of 868 at the Cincinnati meeting was attributed to the announcement of that subject, and to the opportunity afforded members of the Society to co-operate with the National Machine Tool Builders' Association with whom a joint session was arranged. So important had become the relation of the engineer to the problems resulting from the War, that the Committee chose for the keynote session of the Annual Meeting, December 14-17, "Service of the Engineer to the Public in Times of National Crises." Honorary membership was conferred at the annual meeting upon Maj. Gen. George Goethals. The address of the evening at these exercises was delivered by the late William Howard Taft, the twenty-seventh President of the United States.

As is evidenced by this short statement of our activities for the year, all our efforts were directed toward assisting the government of the United States in every possible way, efforts which, I believe, resulted in considerable benefit to our Nation and in increased recognition of the A.S.M.E. and the engineering profession. It was, in reality, the first great test of our worth as citizen-engineers.

This year marked the first public hearing of the Boiler Code Committee. At the end of the year the A.S.M.E. Boiler Code was found to be operative in nine states and eight cities of the Union, was in use in the Republic of Argentine, the Republic of Paraguay and New Zealand, and was recognized by our own government in the specifications of boilers for use in the Canal Zone and at the Naval Training Station at Newport, Rhode Island.

Charles T. Main—1918

AS THIS country was at war during nearly all of the year 1918, the Society was carrying on many unusual activities. Among these were representation on the Naval Consulting Board and on the Committee on Industrial Preparedness; co-operation with the Military Engineering Committee; and representation on the Committee on Engineering of the National Academy of Sciences. The Journal of the Society was supplying the Technical Information Bureau of the Research Council a regular service of engineering data, and the Society was an active member of the Engineering Section of the Advisory Commission of the Council of National Defense. The Engineering Service Committee classified the membership for numerous demands of the Government.

CHARLES T. MAIN

Both conventions of the Society were war conven-

tions at which there were constructive programs devoted to the problems of the war. The Spring Meeting at Worcester was a great success. The Society was very active on the Fuel Conservation Committee. Action at the Cincinnati meeting resulted in having certifications of all gages at one place, thus tending to uniformity in product.

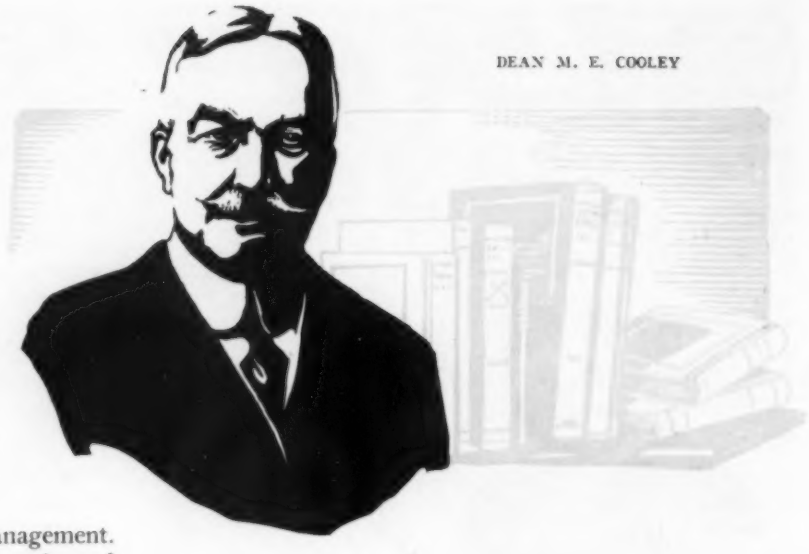
Twenty members of the Society were appointed to act on the Regional Committees of the Resources and Conversion Section of the War Industries Board with a Central Committee of three in New York. The Society sent two delegates to the Joint Conference in London on Air Craft Standardization, and rendered great assistance to the Belgian Mission which came to this country to study scientific management. Individual members contributed to the prosecution of the war at home and abroad, and were found in every department of the Government where engineering knowledge was required.

The Society's service flag bore over 1,400 stars. Noteworthy also is the work of civilian members engaged in producing supplies necessary to those at the front.

Marked progress was made in the internal affairs of the Society. The Sections Committee was authorized to report to the Council a procedure whereby the Nominating Committee would be chosen through the medium of sectional groups instead of being appointed by the President. A Committee on Administration made a survey of the internal affairs which made many helpful suggestions. The Constitution was amended so that the Standing Committee of Administration could sit with the Council without vote. The Boiler Code Committee's final revisions, after a vast amount of very valuable work, were printed in the *Journal*.

All of the regular committees continued their excellent work. The appropriation for the Research Committee was substantially increased. The Power Test Code Committee was reorganized with sub-committees for each particular code.

At the Annual Meeting in December, the President was selected to represent the Society in the Delegation of Engineers, and was sent to France to consult with the French engineers on the rehabilitation of France.



DEAN M. E. COOLEY

Dean M. E. Cooley—1919

ON THE whole, 1919 was a quiet year taken up with the usual routine of a Society that is constantly doing things. The Great War being just over, there was a cessation of war-time activities and a return to a peace program.

Serious consideration was given to committees to the end that the work of the Society might be more effective and wide-spread throughout the country. The success of the Society depended on its country-wide activities. Its 11,882 members must be made to work in whatever locality they resided. A Committee on Committees, after careful study, recommended grouping standing committees into administrative, professional, and non-professional groups, each group to have standing and special committees. An effort was made to appoint to these committees outstanding men in all parts of the country, and as far as possible keep the membership sectional so as not to require excessive time and expense for travel.

Local Sections were encouraged and developed. They provide the means for maintaining interest in the Society as a whole, and at the same time afford opportunity to develop local engineering affairs along lines approved by the Society. It was constantly kept in mind that the Society to be truly national must be active all over the country. The policy was for headquarters in New York to go to its membership, rather than for its membership to come to headquarters in New York. The 36 Local Sections of that year were very actively interested.

The Spring Meeting was held at Detroit in the middle of June. The Annual Meeting in New York was attended by 2,116. These meetings were full of interest and stimulation. The Local Section at Detroit took great pride in the program, and carried it out most effectively.

The Boiler Code committee and the Power Test Codes committee were notably active, and maintained the high standards that have given them their powerful influence throughout the States. The achievements of these committees, particularly the older Boiler Code Committee, entitle them to feel great pride in their work.

The Manual of American Standard Pipe Threads was completed, accepted by the Council, and ordered printed in October. This marked another step forward in standardization work.

Outstanding was the Engineering Council meeting in Chicago in April, which was attended by 74 technical organizations. The Jones-Reaves Bill placing all engineering activities of the Government under the Secretary of the Interior was up for discussion and revision, and we were requested to advocate its passage.

A Joint Conference Committee was formed in August by the four Founder Societies, following a preliminary meeting early in July.

The work of recataloguing the joint engineering libraries was begun. It was that this notable collection

of engineering books and manuscripts should be made completely accessible to the engineering public.

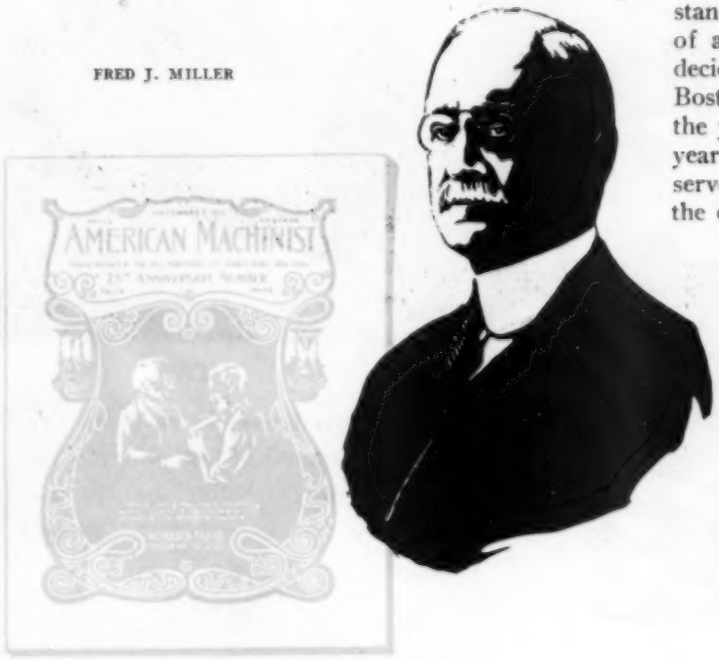
The year was most enjoyable. Headquarters staff was considerate, and energetic in its response to innovations.

Fred J. Miller—1920

PERHAPS the most important event of 1920, from the standpoint of the Society, was the organization of the first Professional Sections, now called Professional Divisions. For some time previously, a group of us had been impressed with the fact that the field of mechanical engineering had so expanded, diversified, and specialized that scarcely any one paper or discussion could be of vital interest to all of the members, and the regretable practice of organizing new societies to specialize in certain branches of the profession had begun. So, in 1920, our Society authorized eight such divisions: Fuels, Machine Shop, Management, Materials Handling, Ordnance (afterward changed to National Defense, which I think is not so good a name for it), Power, Railroad, and Textile. Though regretted, and reasonably so, by some of the members, the plan proved an immediate success and resulted in the 16 divisions of today, each with its special organization and officers, and with sub-committees in charge of special branches of its work.

Another important step taken in 1920 was our Society's active and vigorous support of the plan for a joint organization of all American engineering societies. The organization was formed in Washington on June 3 and 4 of that year. Herbert Hoover was active in promoting its organization and was its first president. He resigned before his term had expired because he had been made a member of the Cabinet, but not until by his guidance, it had been put upon its feet and started in the right direction. He organized and appointed the members of what constituted the now-famous "Wastes in Industries" committee, whose report is now favorably known all over the world.

FRED J. MILLER



Since 1920 was the Fortieth Anniversary of the organization of the Society, it was celebrated by a meeting in the engineers' auditorium in New York, and by meetings of 32 of the existing 38 local sections, to each of which was sent a phonograph record containing short addresses by Past President Hollis and myself.

The keynote of the meeting in New York, so to speak, was the "Opportunity and Responsibility of the Engineer in Industrial Relations." Addresses were made by Past President Henry R. Towne; A. P. Davis, president of the A.S.C.E.; W. L. Saunders, past president of the A.I.M.E.; Charles F. Scott, past president of the A.I.E.E.; and by J. Herbert Case, Samuel Gompers, and William R. Dickson. For "allowing" Mr. Gompers to speak at the meeting, the Secretary and President were afterward rebuked by members who evidently knew nothing of the great service rendered the Nation by Gompers and his organization during the World War, and who held the naive idea that the only way to deal with unions was to pretend that they did not exist.

Finally, in December of that year, was held the joint meeting of the New York section of the Society with the Taylor Society and the New York section of the A.I.E.E. At that meeting, where I had the honor to preside, Horace B. Drury, an economist, presented the results of an extended inquiry into the workings of the two-shift and three-shift systems in American steel mills, which indicated that the two-shift was cruel, against public policy, and economically unjustified. Shortly thereafter, Judge Gary announced its abandonment. Though the two-shift may not have entirely disappeared in all industries, it will disappear, because "What is right is expedient."

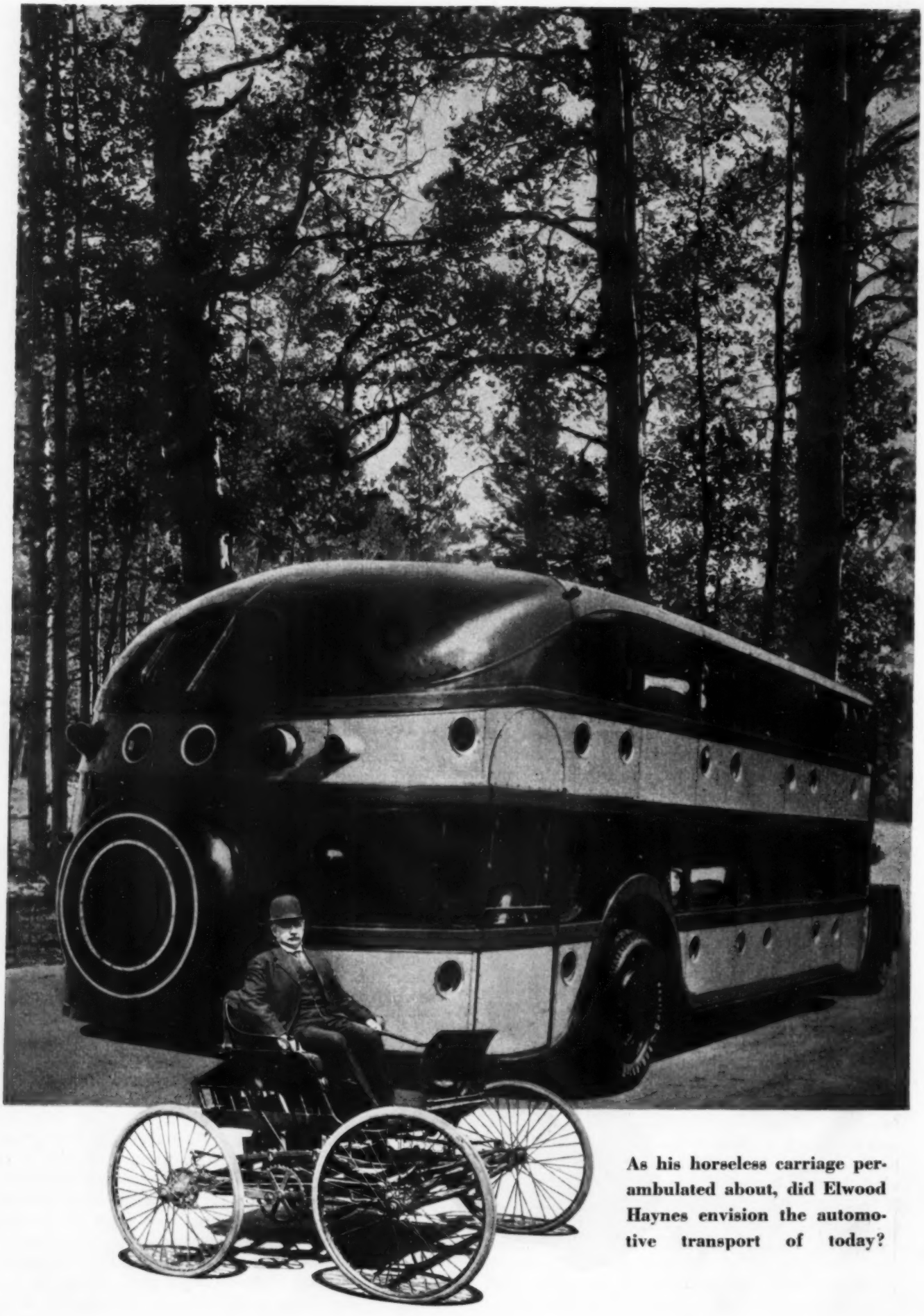
Edwin S. Carman—1921

THE Society in 1921 had been in existence for forty years, a period which we considered the first epoch in its development. We are now ten years into the second. One evidence of the beginning of the new epoch was the striking increase in membership.

The year 1921 was an important one in research and standardization work. The year saw the formulation of a proposed new and more simplified Constitution decided upon at the March meeting of the Council at Boston. The first rules of the Society were adopted in the year of organization 1880 and were in force four years; then followed a general revision. This revision served for ten years, and in December, 1903, under the direction of Council, a third Constitution and By-Laws was formulated. The revision in 1921 was due to expansion and changes in policies, to eliminate unnecessary detail, and for simplification of statement. The By-Laws were generally edited and revised.

Our belief was at this time that the great problem facing the engineering profession was human relations. As one result of this feeling, on invitation from the British and French engineering societies, a deputation from the American societies was sent to Europe to exchange courtesies and to award the John Fritz Medal to Sir Robert Hadfield and Eugene Schneider.

The forty-second Annual Meeting was held



As his horseless carriage perambulated about, did Elwood Haynes envision the automotive transport of today?

from December 5 to 9, with 1,854 registered. Of the nineteen professional sessions, nine were conducted by new Professional Divisions of the group of twelve that had been added during the year. The most important business was the consideration of the new constitution and two amendments to the old, one concerning the voting of junior members, the other concerning the mechanism for letter-balloting on the new constitution. The Local Sections meeting was attended by 44 delegates, representing the greater number of the 51 Local Sections in existence at that time. Eight new sections had been added during the year, the same number as added to the 62 Student Branches.

Honorary memberships were conferred on Nathaniel Greene Herreshoff for his attainments in the field of naval architecture, on Marshal Ferdinand Foch, Generalissimo of the Allied Armies, for his achievements in the field of military engineering (also recognized at the same time by the other Founder Societies), and to Past-President Henry R. Towne, for his attainments in mechanical engineering. The first award of the A.S.M.E. Medal was also made to Hjalmar G. Carlson for his invention and part in the production of 20,000,000 Mark-III, drawn-steel, booster casings.

Several changes were made in publications of the Society, one of them being the separation of the *A.S.M.E. News* from *Mechanical Engineering*. Standardization work was emphasized in our own committee work very closely with the American Engineering Standards Committee. An Advisory Committee was appointed to co-operate with the National Research Council.

The Spring meeting of the Society was held at Chicago, and the registration exceeded that of any Spring meeting of the Society. For the first time in our history a session was devoted to the subject of Training for the Industries. There was a session devoted to the consideration of the engineering problems of the City of Chicago at which F. K. Copeland, then president of the Western Society of Engineers, presided. A public hearing was held for discussing three of the proposed A.S.M.E. Power Test Codes, and prior to the meeting a visit was made to McCook Field in accordance with the plan instituted by the new Aeronautics Division to develop the interest of the engineering profession in a general National Aviation policy. The Air Service had prepared an elaborate program and we learned a good deal about a subject which at that time was comparatively new to most of us.

EDWIN S. CARMAN

Dean Dexter S. Kimball—1922

THE term of office of the President of the A.S.M.E. is too brief to permit him to claim any large amount of credit for any progress that may take place during his incumbency. At best he can only help to direct the course of events of which the Council, after all, is the controlling power. Like all Presidents of the Society, I inherited certain problems and conditions concerning which I could make recommendations. Of the several such inheritances, two were of paramount importance.

DEAN DEXTER S. KIMBALL

The first was the question of finances. The Society emerging from the war period was faced with the common problem of advancing prices and a fixed income. A study of this problem, which was started during the year of the writer's presidency, resulted in the succeeding year in an increase in dues and in a new and better system of budgeting the income and outgo of the Society which proved so effective as to remove, in a short period, all financial distress, and to place the Society upon a sound financial basis.

The second movement that came out of this period was an effort to bring all members into closer relationship with Society headquarters, a need that had already been noticed as the size of the Society increased. It was during this and succeeding years that the present system of bringing Local Section delegates to the Annual Meetings and of strengthening the bond between the Local Sections and Society headquarters by holding regional meetings and by visits of Society officers to local centers was introduced. It was recognized, in other words, that the spirit of the Society must be carried to those who cannot, in general, attend the great meetings of the organization as a whole.

Movements and changes of this sort are rarely sudden in character. They grow naturally out of the life of the Society, and the recognition and safe guidance of them are usually the work of more than one mind. The Society is a "going concern" which so far has had many wise advisers. And lastly, there is always the permanent secretary on whom rests the major responsibility of carrying forward the work of the Society. Every President who has had the pleasure of working with Calvin W. Rice will gladly testify to his helpful co-operation and wise advice.

John Lyle Harrington—1923

SINCE its organization the development of the A.S.M.E. has been continuous, corresponding closely to the industrial development of the United States, with which it is so intimately associated. But the rate

JOHN LYLE HARRINGTON

of growth has varied greatly. The World War gave enormous impetus to industry, and its engineers turned to the A.S.M.E. for aid and stimulus. The Society grew very rapidly in numbers, in interests, and in activities. The Constitution, then more than twenty years of age, drawn for a comparatively small organization of much more limited scope, had been found to be ill adapted to current needs. It contained not only constitutional fundamentals but the bulk of the by-laws as well; it had been amended from time to time till it was far from homogeneous, and the method of change was laborious, requiring much time. Since its adoption the Local Sections had been established, making the Society a living body, with active groups meeting frequently at all principal industrial centers; and the Professional Divisions were beginning to find themselves and to give to those interested in any special industry opportunity for close co-operation in working out their technical problems. Industrial management had come into large importance; a beginning had been made in standardization; research problems were pressing for solution; and through the American Engineering Council, then in its infancy, a sense of responsibility in public affairs was being developed. All of these new phases of the Society's activities were in their initial stages, and a great body of new members was seeking the way to participate in the work and the benefits of the Society. The time had come to sum up, to take stock, to consolidate the gains. A new constitution adapted to modern conditions was urgently needed.

The formative work and the debate over it continued through two previous years, and in 1923 the Society adopted a Constitution which contains only the fundamental law. The great body of the law is placed in the By-Laws and Rules which may readily be altered and adapted to changed conditions by the Council.

But the adoption of a flexible law was only a part of the stock taking. An analysis disclosed that the actual cost of the direct service to the members materially exceeded the dues, that the Society's publications were carrying a considerable portion of the financial load, and that the dues must be increased if the Society were to live up to its obligations and fulfill its mission. The matter was then placed squarely before the membership and the increase was readily voted. The higher cost of membership may have caused some resignations, may have forestalled some applications for membership, but the additional income has enabled the Society to establish a substantial, liquid reserve, to strengthen its Local Sections and its Professional Divisions, to broaden its participation in research, to develop an unparalleled index to engineering literature, and to render greatly increased service in many other lines, to its membership and to industry.

Fred R. Low—1924

MY RECOLLECTIONS of the year of my administration are a blend of pleasant association and co-operation with a lot of good fellows, but no particularly outstanding features or accomplishments.

We did one thing. We found a practically general agreement on the part of the membership that the dues of an organization like the American Society of Mechanical Engineers ought to be sufficient to maintain the dignity of its position among the leading professional societies of the world and to enable the ad-

FRED R. LOW

ministration to carry out its high endeavors for the adequate expression of engineering thought and achievement in an age in which they are so predominant.

The World Power conference in London was, to me at least, one of the outstanding events of the year. The great hall at Wembley was packed with a brilliant audience which included scores of those whose words and works adorn the literature and achievements of engineering all over the world. America and our Society had a prominent part in it and its transactions.

Growing out of a reference by this Conference to the International Electrotechnical Commission of the question of an international understanding with regard to turbines has come the organization of an international committee upon prime movers of which the United States Committee of the International Electrotechnical Commission has been charged with the secretariat. The U. S. Committee, looking to our Society for advice and co-operation in mechanical matters, has relied upon our representatives largely, not only in the direction of the secretariat but in the formulation of its own contributions to the subject. And the American view is being presented by those who have behind them years of experience in the preparation of the A.S.M.E. Test Codes.

The Power Test Codes Committee completed several of the twenty-odd codes in the formulation of which it is engaged and made satisfactory progress with others. The Boiler Code Committee made progress in its service of defining safe practice in the design, construction, installation, and maintenance of boilers and other pressure vessels, and of advising those charged with the execution of laws governing their installation and use.

Many of the other committees did excellent work, but I am writing this in Florida, remote from access to the records and am unable to particularize.

The present organization of the professional activities of the Society was inaugurated by regrouping the Professional Divisions into six classes: Administrative, Power, Metal Industries, Non-Metal Industries, Transportation and Handling, and General.

We saved the *Transactions* for another year.

The Spring Meeting was held in Cleveland, 950 members and guests participating. At the Annual Meeting the registration reached 2,714, and the membership, notwithstanding the increase in dues, was maintained at 15,899.

Dr. W. F. Durand—1925

THE year 1925 was for the Society one of continued growth in numbers and of widening influence in its various activities.

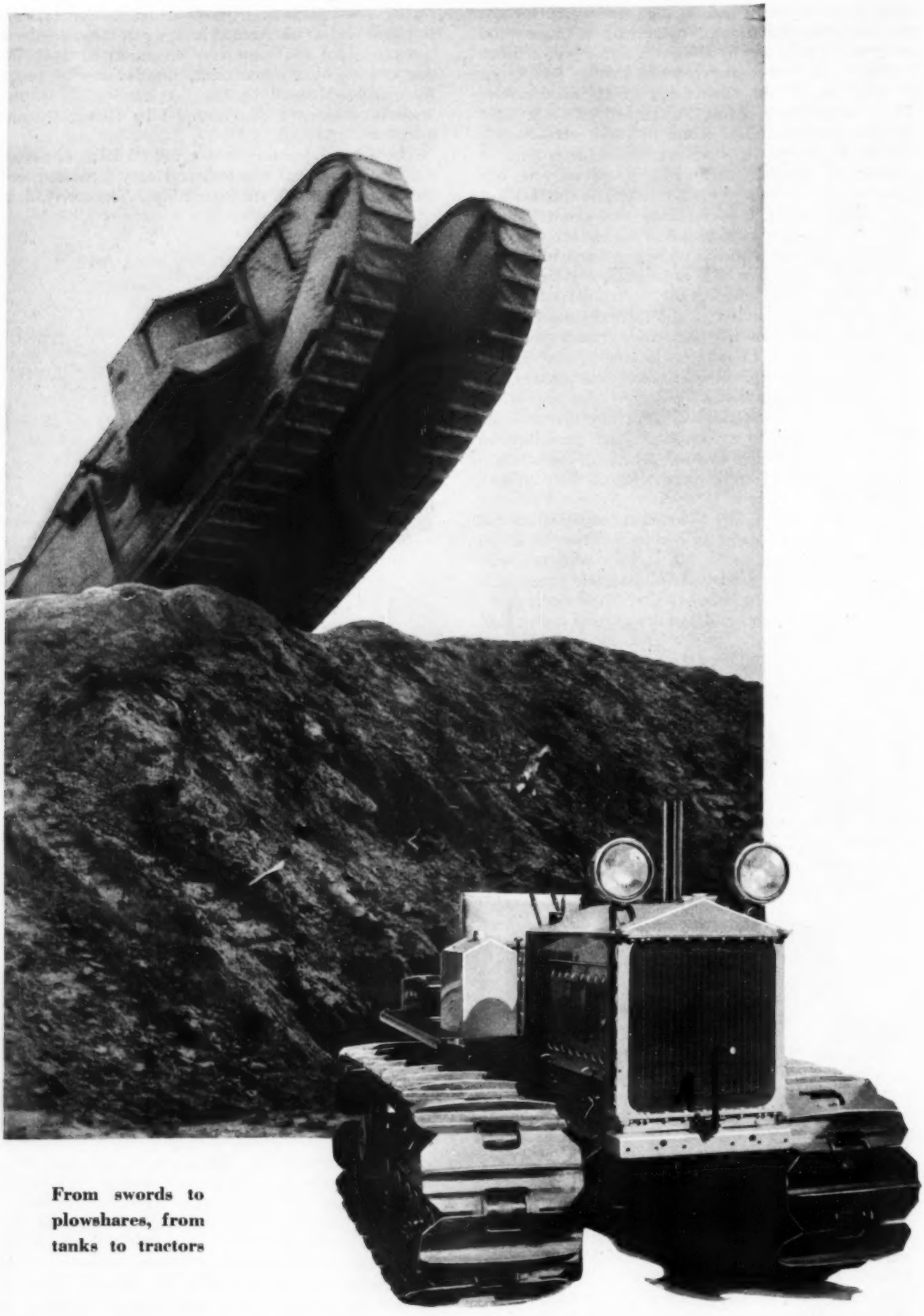
The subject of industrial preparedness as an insurance against war was then occupying much of the thought of the military and naval authorities in Washington, as well as of leading industrialists throughout the country. Early in the year a conference was arranged in Washington with representatives of the War and Navy Departments, their views on these matters were sought, and the services of the Society for any possible furtherance of these purposes was placed at their disposal. This was followed at the Spring Meeting held in Milwaukee by an address by Hon. Dwight F. Davis, Assistant Secretary of War, on this general subject, and later at the Annual Meeting in December by a special session and conference on industrial co-operation with the War Department, presided over by Judge Gary and addressed by the Secretary of War, the Assistant Secretary of War, and by Generals Summerall and Harbord.

The Annual Meeting in the fall of 1925 witnessed the inauguration of the Robert Henry Thurston and the Henry Robert Towne lectureships. The ever-widening contacts between engineering and science on the one hand and engineering and economics on the other seemed to justify a special effort to mark these relations by two addresses at the Annual Meeting of the Society, to be delivered by leading authorities in these fields, and to be devoted, the one to some phase of science in its relation to engineering and the other similarly to the dependence of engineering on economics. On the occasion of the Annual Meeting in 1925, the Robert Henry Thurston lecture on Science and Engineering was delivered by Dr. Zay Jeffries on the subject: "Engineering and Science in the Metal Industry" and the Henry Robert Towne lecture on the economics of engineering by Hon. Herbert Hoover, then Secretary of Commerce, on the subject, "The Economic Value of Research in Pure Science."

DR. W. F. DURAND

This meeting was further signalized by the bestowal of two honorary memberships, one on Herbert Hoover and the other on Worcester R. Warner, Past President of the Society.

At the World's Power Conference held in London in 1924, it was agreed that the International Electrotechnical Commission should undertake the task of developing international agreements regarding specifications and test codes for the prime movers of electric generating machinery, and with attention especially directed to hydraulic and to steam prime movers as designed and intended for this purpose. In consequence of this undertaking, the Society was invited by the American National Committee of the I. E. C. to become an active member of the organization supporting that Committee, and to name representatives on the American National Committee with special reference to the enlarged scope of the work to be undertaken. In accordance with this request and recognizing herein an opportunity for service of an international character,



From swords to plowshares, from tanks to tractors

the Society in 1925 made definite provision financially for such participation in the work of the I.E.C. and named representatives of the U. S. National Committee. Following this entry into the work of the I.E.C., the Society has taken a prominent part in international meetings held in New York in 1926, in Bellagio, Italy, in 1927, at The Hague in 1928, and in London in 1929.

W. L. Abbott—1926

AN INNOVATION for 1926 was the holding of the Spring Meeting on the Pacific Coast, the first in 34 years. This meeting furnished the opportunity for 163 members of the Society and their friends to journey by special train from New York and Chicago to the meeting. The trip covered 8,800 miles by train and 1,200 by automobile, made exceedingly attractive by the hospitality of the Local Sections in the cities through which the train passed. The San Francisco Section developed an excellent organization for the conduct of the meeting. Dr. Robert A. Millikan was awarded the A.S.M.E. medal "in recognition of his contributions to science and engineering."

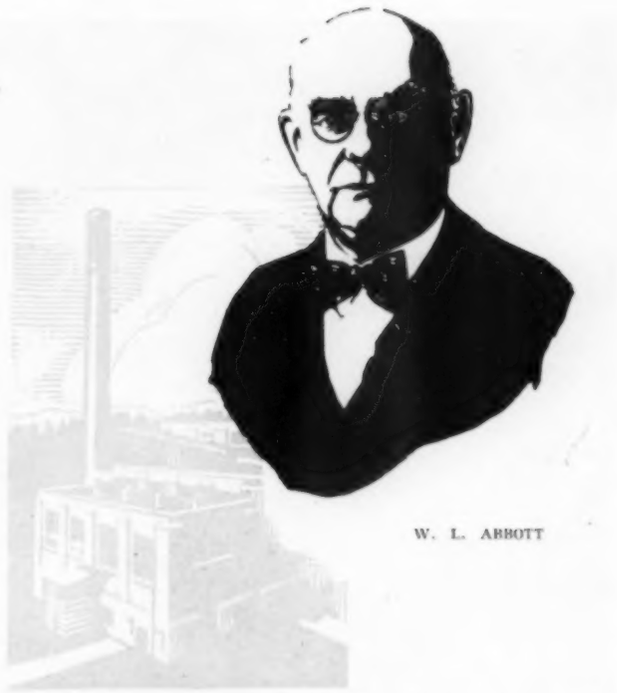
Some amendments were made to the Constitution whereby the junior membership age limit was raised from thirty years to thirty-five years, and those of our venerable members still in junior grade, with ages ranging up to seventy-five years, were persuaded to change to regular membership grade. The Treasurer, who heretofore had been an elected official, and member of the Council, was made an appointed officer by the Council in the same manner as the Secretary is appointed from year to year.

The value of the Professional Divisions to the Society was recognized by making the Professional Division Committee a Standing Committee of Council rather than as heretofore elected by the chairmen of the various divisions. The Standing Committees are appointed by the President, the terms of the members being for five years, one member retiring each year. Another most important development in Professional Divisions was the institution of divisional meetings, national in character. These meetings are instituted under the approval of the Standing Committee on Local Sections, Professional Divisions, and Meetings and Program.

In was an outstanding year in research. With only a $6,000 working fund, six new research projects were begun, those on elevators, worm gears, spark arresters, saws and knives for woodworking, and substitute species for domestic wood.

Through our membership in American Engineering Council, the Society was active in the following projects: The Inventory of Water Resources; the Patent Office Survey, which resulted finally in an appropriation for a new patent office building. The Society also took great interest in Safety, Production, Reforestation, and Fire Prevention.

Secretary Calvin W. Rice, through the request of the Board of Direction of Museum of Peaceful Arts in the City of New York, was granted a short leave of absence to make a European inspection trip and report on the technical and industrial museums in Europe.



W. L. ABBOTT

This project was one in which the Secretary and the Society's Past President and Honorary Member, Henry R. Towne, had been associated, enhancing the reputation of the Society. The Secretary took this opportunity to make professional visits to other bodies, which spread the spirit of fraternal cordiality among sister European organizations.

The membership of the Society during this year reached nearly the 18,000 mark. This maintained our position in the engineering societies in the country, and we will modestly say that we believe our achievements during the year entitled us to a rating *among* the best.

Charles M. Schwab—1927

THE year 1927 seemed to me an especially active one in the history of the Society, one in which the committees completed many difficult tasks. Both in the preparation of technical reports and in the outline of future policies for a broader and more helpful Society they reached out to cover the ever-widening and diversifying interests and duties of the engineer. All technical activities were maintained with great interest and energy, with broad service as the predominating motive. The technical committees had a membership of 1,036, covering a diversity of problems and talents.

During the year the Society co-operated in the Engineering Education Survey with the Society for the Promotion of Engineering Education. This brought out much helpful information for the training of the future engineer and was of great help both to the committees and to the officers in carrying on efficient relations with the colleges through the 92 Student Branches.

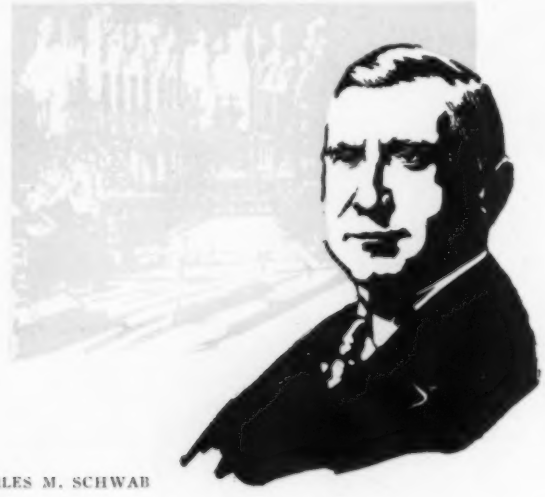
At the personal request of the Council, the Committee on Research made a thorough study of the status of industrial research in the United States and Europe, for the purpose of developing a program for research in mechanical engineering which would be in line with

On the sea and over the sea, glide these transports of civilization

From Kitty Hawk to Municipal Airport, a Continuing Quarter-Century Miracle

past experience and would be broad enough to enlist the interest and financial support of leaders in the engineering and industrial world.

Notable also that year was our representation at the International Electrotechnical Congress in Italy. Dr. W. F. Durand, Past President, was a special representative from the Society and presided at five sessions of the I.E.C. Advisory Committee No. 4 on Prime Movers, having under consideration the proposed international agreement on the testing of hydraulic turbines.



CHARLES M. SCHWAB

The 48th Annual Meeting of the Society was held from December 5 to 9. Attendance is not necessarily a measure of the success of a meeting, but the fact that 2,351 appeared at the registration quarters, thus establishing a new attendance mark, is a source of gratification to those who had the meeting in charge. There were several other happenings in New York during the meeting which contributed very much to its success. The Power Show at the Grand Central Palace attracted a large number of engineers and industrial executives. The American Society of Refrigerating Engineers held its 23rd Annual Meeting, the Power Transmission Association held a luncheon meeting, and the Taylor Society held its Annual Meeting. In spite of all my arguments and pleas to the contrary, I was required to give the usual Presidential address. The title I finally chose was "Human Engineering." As part of the Presidential evening events Dr. Fred R. Low, Past President, introduced Leon P. Alford, as the first Melville Medallist. The A.S.M.E. Medal was awarded to Wilfred Lewis for his work on gear teeth.

During the year the Committee on Publications formulated an entirely new procedure for issuing the publications of the Society. This procedure, developed in co-operation with the Committee on Professional Divisions, with the support of the individual Professional Divisions, promises an increase in the amount of published material and an improvement in the service to individual members. A second important step was the plan for the expansion of the Engineering Index into a weekly card-index system.

The total membership of the Society in 1927 was 16,260 in America and 769 in foreign countries.

In the field of human relations, the employment service conducted by the National Board of Management established branch offices at Chicago and San Francisco.

The Society had 19 elected representatives on the A.E.C., and during the year they took prominent part in the following projects: The Inventory of Water Resources, Patent Office Problems, Street and Highway Safety, Safety and Production, Elimination of Waste Investigations, Standardization and Simplification.

Close contact was maintained with those in responsible authority relating to the Mississippi River problem. The American Engineering Council also was prominent and participated in hearings held by the Federal Radio Broadcasting Commission. Their committee report became the basis of most of the discussion by the Government committee.

The outstanding impression which came from a year's service as President of the Society, is the increasing complexity of the Society's interest, extending not only to a large number of subjects, but to other countries. It is hoped that the A.S.M.E. may become more and more, with the other engineering societies, a veritable ambassador of good will in the pursuit of its work in advancing the arts and sciences.

Alex Dow—1928

A VARIETY of activities occupied the Society during 1928, among them preparations for the World Engineering Congress at Tokyo in 1929, further gratifying increases in standardization work, and co-operative movements with the other Founder Societies. By invitation, the Society was represented on twelve national investigating committees.

The Society contributed to the summer school for engineering teachers conducted by the Society for the Promotion of Engineering Education, for improving methods of instruction in the engineering colleges. Another activity, in which the Local Sections Committee led, was co-operation with the Institute of International Education in placing foreign engineering

ALEX DOW

graduates in American industries for a two-year period.

A summary for 1928 shows a total membership of 19,082, an increase of 650 members.

Professor Henri le Chatelier was elected an honorary member for his work in introducing new methods of physico-chemical analysis, now considered so indispensable in all metal-working establishments. Honorary membership was awarded to past-presidents Ira M. Hollis and Mortimer E. Cooley. Several members received exceptional honors, among them Thomas A. Edison, honorary member; Charles M. Schwab, past president and honorary member; and Henry Ford and Herbert Hoover, honorary members.

Two important and far-reaching developments in Society publications were initiated during the year. The Engineering Index Service was established and the procedure of issuing *Transactions* was changed radically. The Engineering Index Service is the logical development of the Engineering Index. The new publication procedure was a recognition of the importance of the sixteen Professional Divisions, as well as of the fact that many published papers of the Society were being distributed to those who could not make use of them. The new scheme provided for the printing of *Transactions* in quarterly sections, one section for each of the Professional Divisions.

The year stressed some outstanding developments in the history of the Local Sections movements. The Susquehanna section was organized with headquarters at York, Pa., bringing the number of sections to 69. Student branches numbered 94.

Under the amended Constitution, the Council in 1928 was composed of a president, five past presidents, seven vice-presidents, nine managers, and the chairman of the sixteen standing committees of Council, with the treasurer and secretary elected by the Council.

Elmer A. Sperry—1929

I THINK perhaps the outstanding event during my term as President of the Society was the World Engineering Congress in Tokyo from October 29 to November 7. The original thought was that a party of mechanical engineers should visit Japan, but engineers of all branches were so impressed with the idea of seeing Japanese advancement that it very soon grew to include members of all engineering societies in America. President Hoover, then Secretary of Commerce, gave the proposition great inspiration and impetus by allowing the use of his name as Honorary Chairman of the American Committee.

The Congress was the greatest of its kind ever held. The attendance made a very remarkable showing, there being 500 delegates, members, and guests from overseas representing some 21 countries, together with more than 3,000 Japanese members. Technical sessions, with as many as sixteen section meetings held simultaneously, were conducted most efficiently.

The participation of Japanese members was particularly impressive, for they presented many papers which constituted vital contributions in all branches of engineering.

Fifty years of Society history, 25 years of Local Sections activity, 10 years of Professional Divisions

ELMER A. SPERRY

achievement—these were the milestones that marked the 1929 Annual Meeting, held in New York from December 1 to 5. Official figures showed that 2,215 persons were registered during the week of the meeting, which I understand, had such an extensive program that it was found impossible to schedule committee meetings, technical sessions, and excursions without the interference of many kindred interests.

CHARLES PIEZ

One important thing which should not be forgotten is an appreciation of the work of the Professional Divisions, and the value of their work in uniting the membership of the Society. Ten years ago, they were established to counteract a tendency to form other professional societies. For individual groups of the Society's members, irked by what they considered inattention to their specific interests, tried persistently to break away and to form smaller societies devoted to specialized engineering subjects. It is gratifying to say today that the work of the Professional Divisions since that time is overcoming this tendency.

The year also marked the 25th Anniversary of the first Local Section, founded at Milwaukee in 1904. Since that time, the Work of the Local Sections has become increasingly important, until last year, at the Annual Meeting, there were 66 representatives present from the 71 Local Sections.

WITH the election of Charles Piez to the 1930 Presidency, the A.S.M.E. goes forward. Under the joint guidance of Mr. Piez and Calvin W. Rice, the Society enters its second half-century of evolution, usefulness, and obligation. Thus we come to the Golden Anniversary Celebration. "What is not yet may be."

CATHEDRAL OF INDUSTRY

Beyond the most grandiose dream of fifty years ago is this machine shop of today

THE ROLE OF ENGINEERING EDUCATION

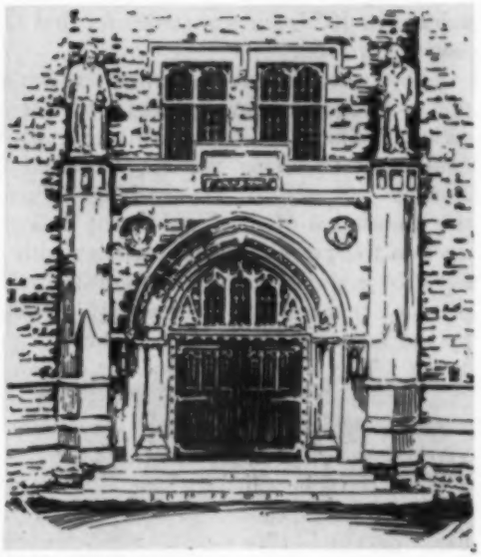
DEXTER S. KIMBALL
Dean of Engineering, Cornell University

WELL-INFORMED men will agree, I believe, that the growth of present-day engineering, and resultant modern manufacturing, has been due in large measure to the extended use of scientific methods. While it is true that the old empirical methods, in the hands of men of great experience, produced some remarkable results, it is equally true that these methods had definite limitations. So long as the work in hand was similar to something already performed, both in size and character, no great difficulty was involved. But where a long step forward either in size or technical difficulty was needed, progress was necessarily slow and cautious, and was accompanied by many painful experiences.

We are probably indebted to the electrical engineer more than to any other for the rapidity in the growth of applied science during the last fifty years. Here was a field markedly different from the older fields of engine and general machinery building, a field where scientific accuracy was absolutely necessary for success, and where to a large degree even the manufacturing problems were different. The conquest of this field of endeavor in the last fifty years is one of the most brilliant achievements of the engineering mind. The test of a true science is its ability to *predict* future accomplishments, and the electrical engineer measured by this criterion has been very successful.

To illustrate, the first turbo-generator built by the General Electric Company about 1900 was of 5,000 kilowatt capacity. Today turbo-generators of 50,000 kw. are commonplace, single sets of 75,000 and 100,000 kw. are not considered remarkable, and combined units of 325,000 kw. are now under construction. How much larger such installations may be is a question apparently of economic need and not of scientific knowledge or constructive skill.

In the field of civil engineering a similar growth may be noted in the building of suspension bridges where the distance between towers, or clear span of the bridge, has been increased to 1,000, 1,750, and finally 3,500 feet, as in the great structure now being erected over the Hudson River at New York City, the greatest structure ever erected by human hands. But already plans are under consideration for much greater structures, longer spans, and larger cables, the limit apparently, again, being economic and not technical. Other and equally startling illustrations could be drawn from naval construction, architecture, railroading, and other fields, all showing a growth in size and scientific character unequalled in the history of man, and a rate of progress so great as to be almost unbelievable.



PORTAL OF JAMES WARD PACKARD LABORATORY, LEHIGH UNIVERSITY

This growth is reflected accurately in the literature of engineering. Fifty years ago when the American Society of Mechanical Engineers was founded, the *American Machinist* was a pioneer in the field. It is instructive to read its early volumes and those of the Society *Transactions* with their weighty considerations of keyways, pulleys, belts, and the like, all more or less in a "shoppy" vein. Then, as one reads further down the years there appears *experimental* engineering, indicating the need and desire for more accurate knowledge; further on come thermodynamics, strength of materials, and finally the blossoming out into the great literature of the Society and of the technical magazine as it appears today. The whole story of the *American Machinist* and its influence is most interesting, but it belongs elsewhere in this issue.

ALL of this development denotes a very great growth in the scientific background of the engineering profession. Of course no one would be foolish enough to credit all of this growth to the engineering colleges. Science and scientific methods can be, and have been, acquired by many men who never attended college. But the great majority of those who laid the foundation of modern engineering, and who are now laying new foundations for modern industry, were and are products of technical schools.

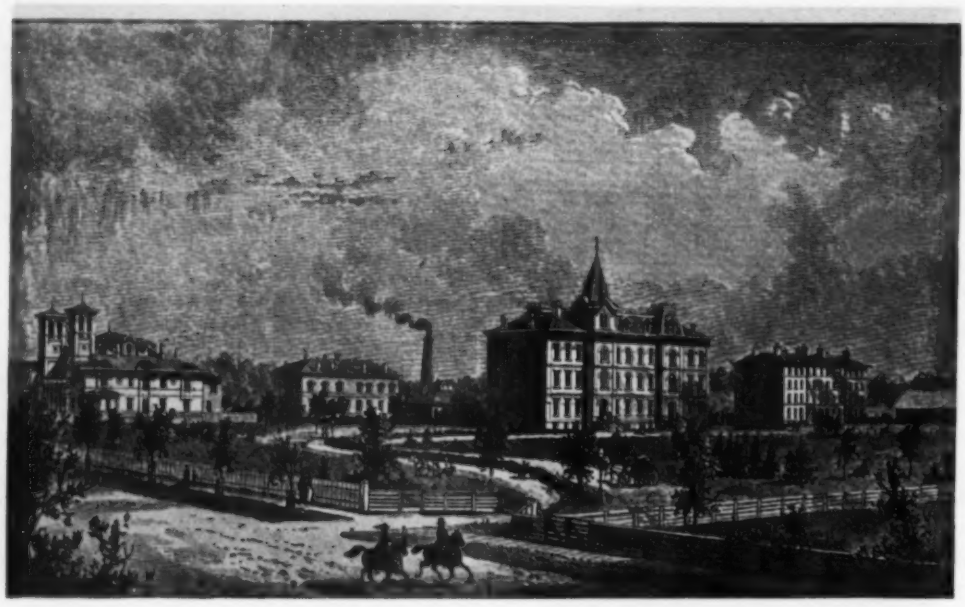
The first technical instruction in the United States appears to have been given in connection with the United States Military Academy at West Point. Naturally, the instruction at this pioneer school was concerned with military problems, but until 1824, it

remained the only important source of engineering instruction in the United States. The Rennselaer Polytechnic Institute of Troy, New York, was founded in 1824 and began the training of "civil engineers" in distinction to "military engineers," as the graduates of West Point were known. Rennselaer conferred its first engineering degree in 1835. The Lawrence Scientific School at Harvard was opened in 1847, and Yale established the Sheffield Scientific School in the same year. The University of Michigan, a pioneer in mid-West engineering education, began instruction in that subject in 1853, and conferred its first degree in engineering in 1860.

These were pioneer movements which strove to meet the growing need among engineers for sounder theoretical training. This need found an even broader fulfillment following the Morrill Land Grant Act of 1862, a document of far-reaching influence which laid the foundation of the Land Grant Colleges now grown up into the great State universities with their fine colleges of engineering and agriculture. Under the impetus of this act and the economic pressure stimulated by the necessities of a new country, engineering grew apace. The School of Mines at Columbia University was founded in 1864, the Massachusetts Institute of Technology in 1865, Cornell University in 1868, and Worcester Polytechnic Institute in the same year. There can be little doubt of the need and usefulness of these technical schools and colleges, and the increase in their enrollment during recent years bears out the truth of this statement. In 1866 there were but six engineering schools of established reputation, and only 300 men had been graduated in the previous thirty-one years. In 1928 the Bureau of Education listed 148 technical colleges of high grade, with a total enrollment of 65,520 students.

The graduates of these institutions fill an amazing variety of positions in industry, from technical engineers down and up through the entire range of management. Their influence on the entire field of engineering and industry cannot be evaluated, and one has only to examine the list of leading figures in such fields as electrical engineering, with its great off-shoots of telephone and radio engineering, modern power plant work, or in fact any field where engineering and manufacturing is a factor, to be impressed with the growing importance of the college-trained man. After all, this is what we would expect. The basic reason why schools of any kind exist is because school methods are the most economical methods thus far discovered for acquiring knowledge and a trained mind. If this were not so, and if the modern engineering school did not fulfill its purpose, it would soon pass out of use and out of existence. Fifty years ago, yes, twenty-five years ago, a diploma from a technical school was the last thing a young man would show in seeking employment. Today all manner of engineering and industrial enterprises of a progressive character are recruiting their administrative and engineering staffs directly from the engineering college. This is not because these young men are already engineers, but because they are equipped with a basic training which, when they have been adapted to the particular enterprise, will enable them not only to carry on the business as it is, but to direct it into new and more prosperous channels. This is the day of the technically trained man, and the employer must acknowledge it.

OF COURSE there is still much to be learned both by the colleges and by industrial leaders of the relation between the colleges and industrial life. Both parties have profited by experience, that of the last twenty years in particular. The colleges have learned that they cannot equip a boy to step directly into the field and assume engineering or administrative duties. At best, all they can do is to instill into him certain methods of thinking and to furnish him with certain basic information. No college can produce an engineer, in the accepted sense of the term, in four or forty years.



AN OLD ENGRAVING OF THE PURDUE UNIVERSITY CAMPUS IN 1880

On the other hand, the idea so often heard expressed by practical men that the college graduate must unlearn all he has learned in college before becoming useful in practical life is equally fallacious. All experience shows that if the engineering college builds a firm foundation of pure and applied science in a general way, this foundation need not be disturbed by any practical work; rather, it forms a solid platform on which the student may build a successful career in a very wide range of activities. Basic science, pure or

applied, is imperishable and need never be discarded; the mental habits that it inculcates need never be abandoned. This scientific background cannot in general be taught in industry and becomes increasingly difficult to obtain individually, as the scientific field broadens and deepens.

It is equally true that the college cannot give that practical knowledge of men and materials, nor that mature judgment which is the hall mark of the successful engineer. This can come only by actual contact with industry itself. But wise employers can do much to hasten the acquirement of these practical attributes by special arrangements whereby the college man can be rapidly adapted to his chosen field of engineering or industry. These general principles were recognized long ago by such progressive concerns as the American Telephone and Telegraph Company, the General Electric Company, the Westinghouse Electric and Manufacturing Company, and many others. The contacts established with many engineering colleges have all done much to create closer mutual relations and better understanding of the problem, and to aid in bridging the gap between the college and industry, a gap that still presents difficulties under even best conditions. One thing is certain, that if American engineering and industry are to make progress, they must be fed constantly with well-trained young men. And the principal source of supply at present is the engineering college.

ADMINISTRATION BUILDING OF STEVENS INSTITUTE OF TECHNOLOGY IN 1880

ONE of the most remarkable developments of the last thirty years has been the application of engineering methods to the problems of management and administration. The inception of this movement came entirely from technically trained men. Taylor, Gantt, Barth, Halsey, and Emerson were all college trained; and most of the early writings through which this new gospel was promulgated came from the colleges and technical schools. True it is that many charlatans and incompetents have also dabbled in these new methods and have done mischief, but this has always been true in all new movements. Today, this new philosophy of management is being put upon a firm basis, and if this basis is not strictly scientific as the term is normally used, it is at least well understood, and when intelligently applied, leads to great economic gains. How scientific it can be made is a question for the future, but there are indications even now that we may yet develop a basis of management that will be truly scientific.

Now no sensible man would claim that technical education has been wholly responsible for the great growth in American industrial life. The inventor, the researcher, the financial promoter, and the business executive have all made their contribution to our industrial and engineering greatness. But without doubt, technical education, whether obtained in college or not, has been the greatest single basic factor in building up our modern life with all of its advantages and defects. And it is not too much to say that the hope of a continuance of our prosperity and progress rests in no small measure upon the intelligence and faithfulness with which the teachers in engineering colleges discharge their highly important functions. This is the rôle of engineering education and educators.

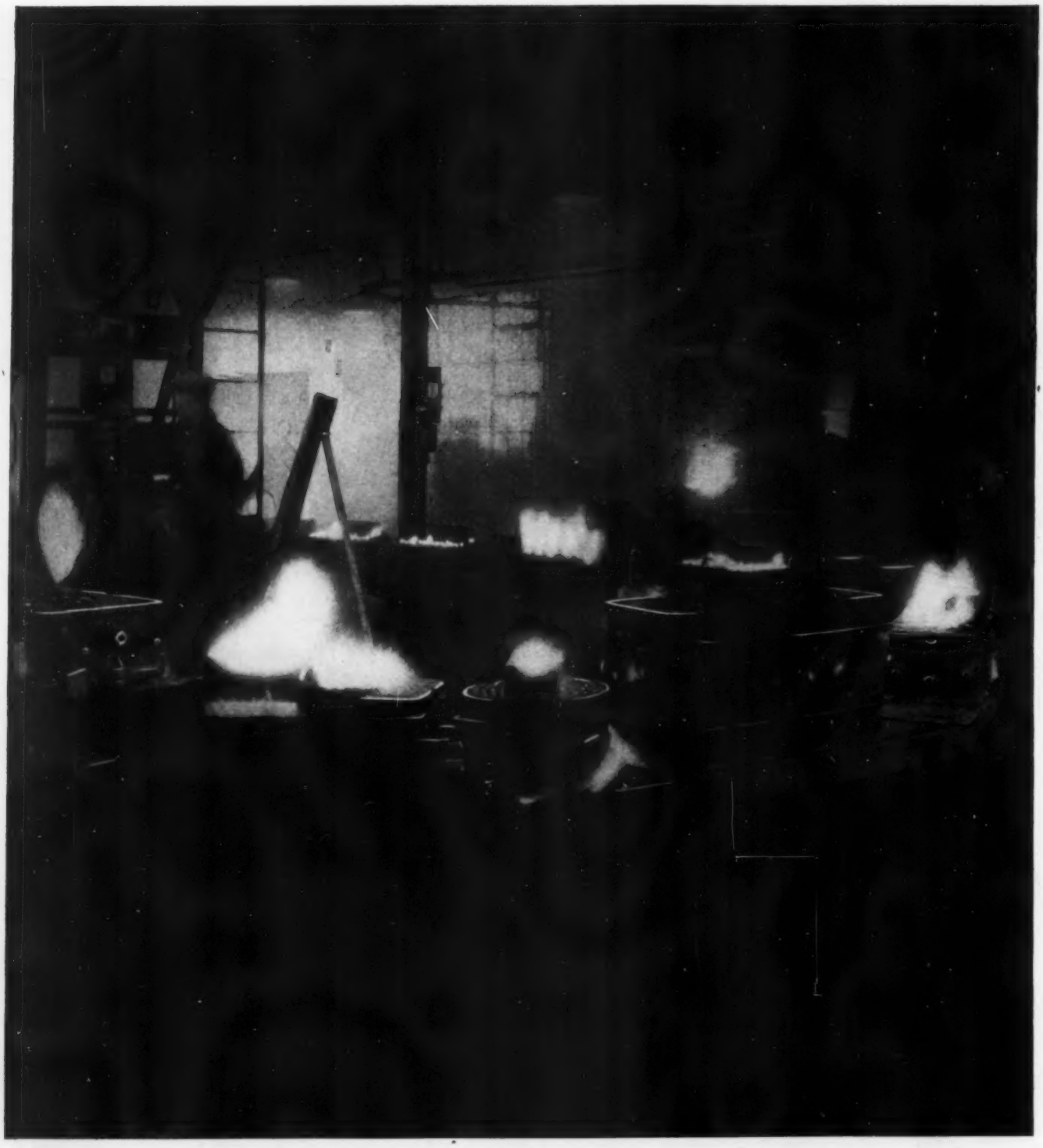
ASSEMBLY HALL OF THE ADMINISTRATION BUILDING, PRESIDENT MORTON ON THE PLATFORM

THE OPEN HEARTH

In an age of steel, or alloys,
the furnace still is king

THE CONTINUOUS MILL

With skill transferred from sweating toilers, the mill rolls out its endless ribbon

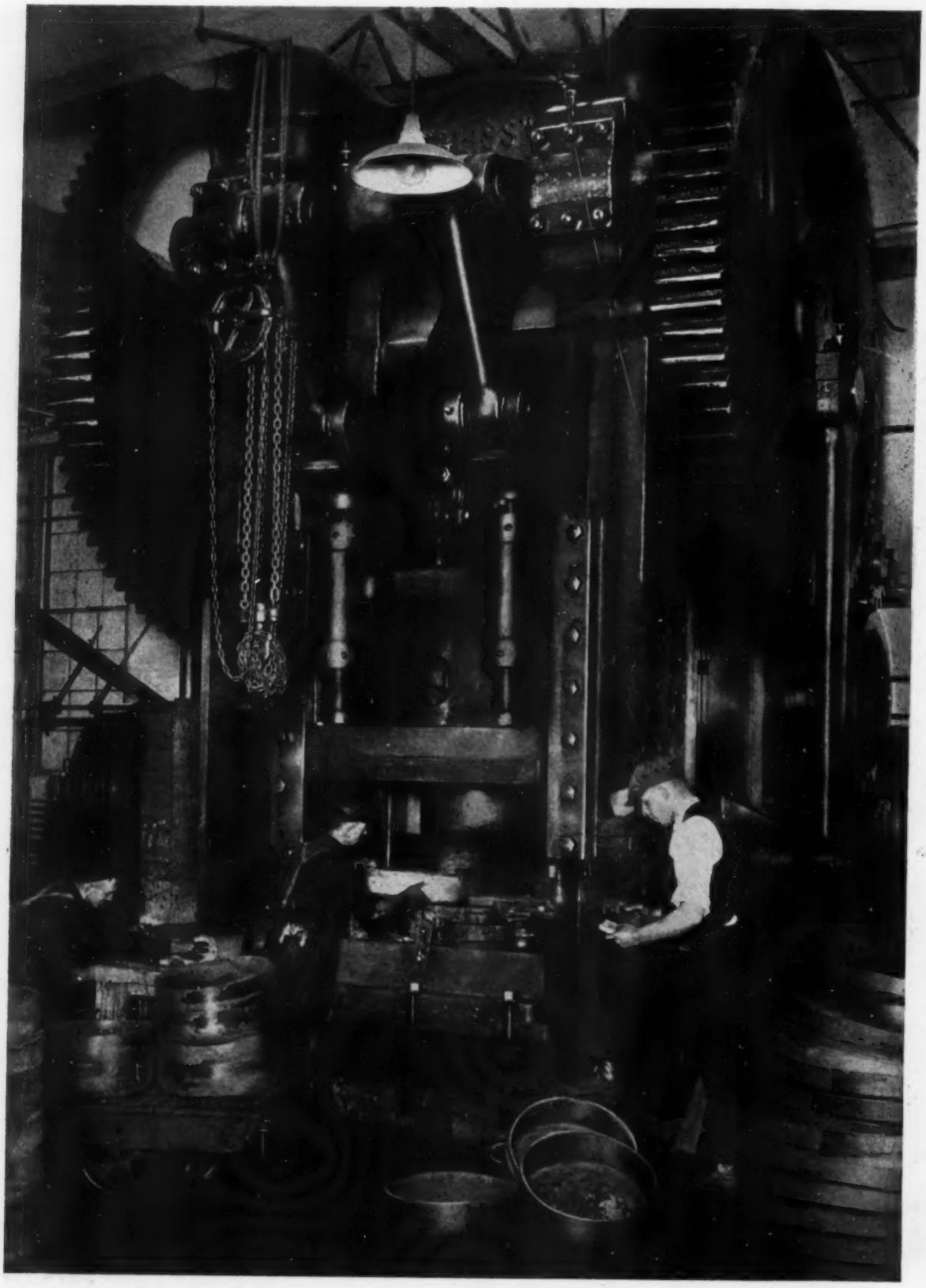


THE MODERN FOUNDRY

Through mechanization, uncertainty and backbreak have been taken out of molding

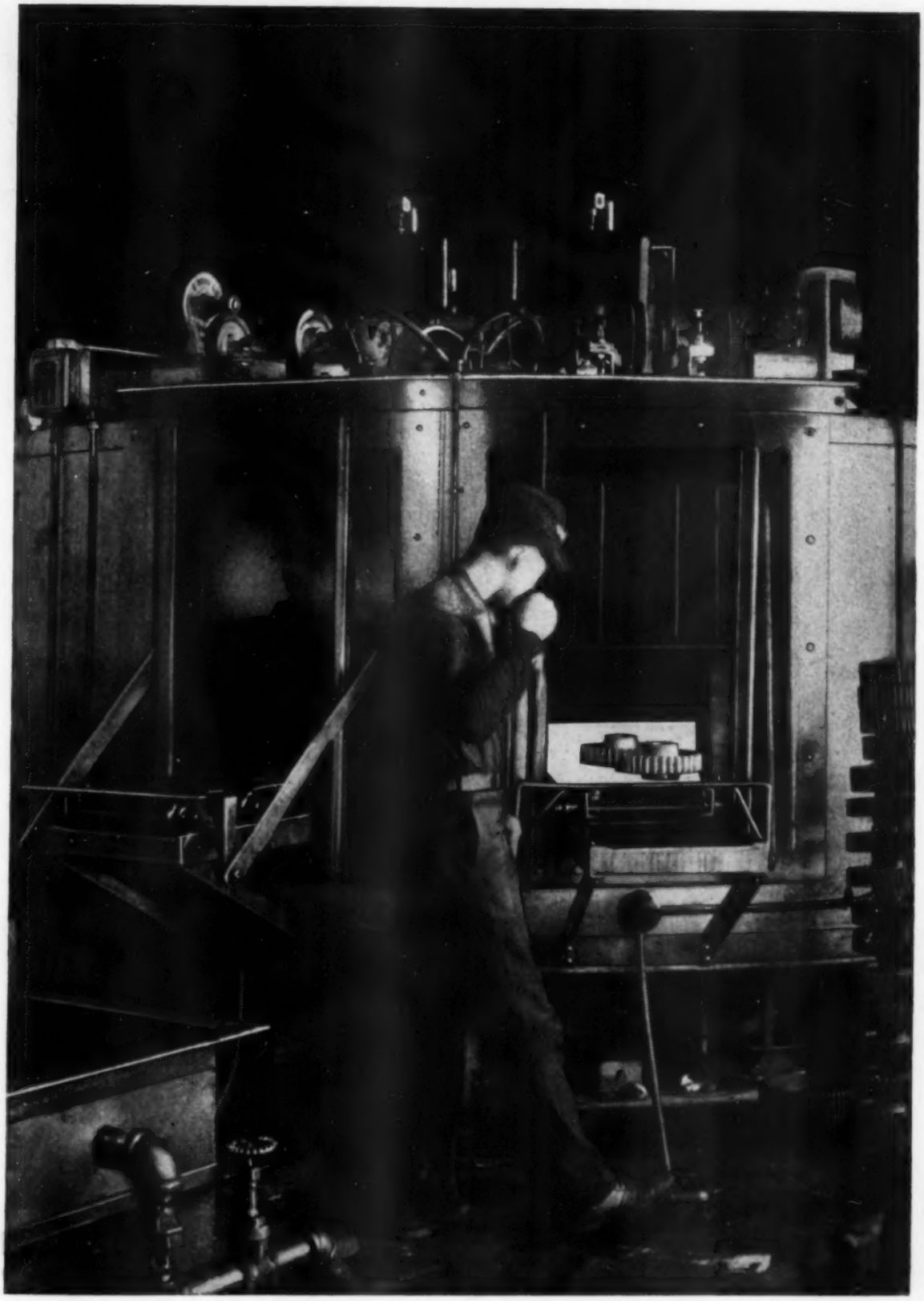
THE ELECTRIC WELDER

His art scarcely imagined fifty years ago, this helmeted artisan is a familiar figure today



THE PRESS

From smooth sheets are formed the manifold objects of everyday living



THE FURNACE

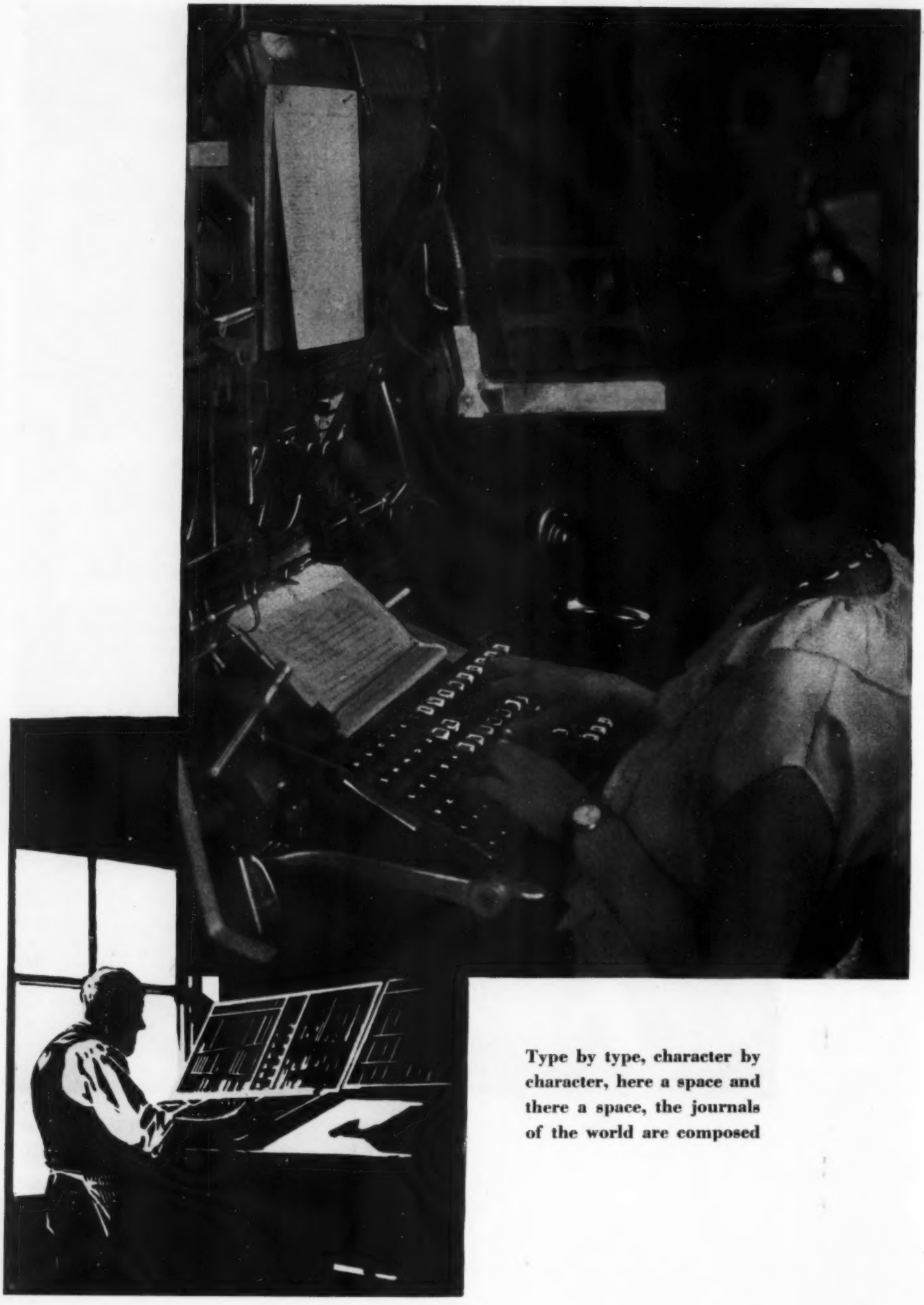
An armourer of Damascus would have traded his most priceless secret for heat-treatment such as this

THE GAS WELDER

Whether used as cutter or welder, his torch is applied throughout all industry

THE ASSEMBLY

Paradoxically, this automatic builder of automobile frames is a newborn pioneer in industry



Type by type, character by character, here a space and there a space, the journals of the world are composed

MOLDING INDUSTRIAL OPINION

F. M. FEIKER
Managing Director, The Associated Business Papers, Inc.

DEAN DEXTER S. KIMBALL of Cornell University has an illustrated lecture on the history of design which seems to emphasize one phase of the development of industrial opinion during the last fifty years. In this lecture he shows how design has developed in that time. In the early days machine tools had legs whose design came down through the ages from Egyptian chairs; modern tools have pedestals and bases. Dean Kimball makes clear that these changes in design have come about through the exchange of ideas and the adaptation to use of fundamental principles.

A review of our progress in the mechanical arts, or indeed in any field of endeavor, will make clear that changes have taken place not only in design but in many other fundamental practices and policies. Art, industrial practice, and science are in a continual state of change. We have different ideas today than we had fifty years ago. This body of ideas which is constantly changing our trade and technical practice as industry develops constitutes what may be called industrial or trade opinion, as contrasted with what we call public opinion.

Public opinion, which concerns itself with social and broad economic questions, changes from decade to decade. We recognize the general fact that public opinion is molded and directed by the newspaper, by the general magazine, by the pulpit, by government pronouncements, by individuals and by organizations, all directed to some specific change in opinion. It is not so widely recognized that there are as truly a group of forces making industrial and trade opinion. It is worth while therefore on this Fiftieth Anniversary of the founding of the A.S.M.E. to point out the parallel between public opinion and industrial opinion. Any one may see the difference between a locomotive with a smokestack and "cow-catcher" of fifty years ago and a modern steam behemoth on wheels. It is easy to compare "horseless carriages" with modern motors. We can make a thousand comparisons of the Alphas of fifty years ago with the Omegas of the year 1930.

Public opinion is a vital force in American life, but it turns largely on an emotional appeal; industrial opinion, another vital force, is devoted to different ends. It is not based upon emotion. Rather is it based on logic, on test, on the interchange of experience, and on the establishment of technical and scientific principles.

It is a happy coincidence that all four of the forces which are today concerned in the development of an industrial practice and opinion should be so intimately related at the time of this celebration. As the writer sees it, representatives of all the four factors in the making of industrial opinion will gather at this commemoration of one of the factors. These are the technical schools and colleges, the Government, the engineering societies and trade associations, and the technical and trade press. How intimately they are inter-woven is indicated by the program for the meeting.

If I have made my meaning clear, it will be evident that our future development of industrial opinion will be governed in large part by the common objectives and the common aims of the four great underlying forces. Of these, the technical schools and colleges have a great contribution to make to industry. Each year they are turning out young men, more and more with the professional point of view toward business, young men who are filtering into trade and industry. Through their influence, the rule of thumb is passing; industrial practice founded on analysis, on logical study and deduction, is gradually taking the place of practice by "hunch."

A second factor in industrial development is the Government, not as an instrument of authority, but as an instrument of education and service. Unpopular as it sometimes is, the Bureau of Internal Revenue forwarded cost accounting practice in this country more than did any other single influence. Because every business man nowadays has to make an income tax report, he has been led to establish accounting practices which he would have side-stepped otherwise. Similarly, other Bureaus of the Government, such as the Simplified Practice Division of the Department of

Commerce, help to establish a "kind of thinking" with regard to uneconomical trade practices which goes far to change the practice of a trade or industry.

And then we come to the third factor, technical societies and trade associations. In America since the war, a great impetus has been given to organized industrial development. The purpose of the constructive programs of such organizations is to make the best practice of the individual the universal practice of the group. Thus, in time, programs of research, of standardization, of design, of trade development, of improved methods, may completely change the practice of that trade or that industrial group. Again, there exists in associated effort a philosophy which may well become an accepted industrial opinion.

JACKSON BAILEY, FIRST EDITOR, AND HORACE B. MILLER, FIRST PUBLISHER, OF AMERICAN MACHINIST, IN 1880

In reviewing the preceding paragraphs it will be evident that the making of industrial opinion is an educational process. It is because of this that the business press, the technical and industrial journals which constitute the fourth factor in the making of industrial opinion, have so great a power and so great an opportunity for leadership. No greater force for practical accomplishment exists than the business press of America. Linked as it is with the heart of industry, in practical contact with the other three great forces and with the individual needs of its particular group, it is a dynamic educational force for raising standards.

No nation has been more fertile in invention and in imagination than the United States. No nation has a technical press more sympathetic to the development of industry. It provides the literature of invention, of industrial and trade practice in the arts and sciences. Industrial opinion is not made by the millions, but by the thousands of men who direct and service industry and trade. The business press is their voice. Herein lies the opportunity for continuing leadership and progress.

THE *American Machinist*, contemporaneous with this, the greatest period of mechanical development in history, has been the reflex, the stimulant, the guiding hand and faithful friend of all this development. It has contributed a great part through the constant development, the outpouring and diffusion of ideas which have dominated our industrial progress

Herbert Hoover

EXCERPT FROM AN ARTICLE BY HERBERT HOOVER, THEN SECRETARY OF COMMERCE, IN THE FIFTIETH ANNIVERSARY NUMBER OF AMERICAN MACHINIST

The editor and the publisher of an industrial journal have high opportunities. The editor is a part of a procession of industry so to speak; at any time he may leave the procession and look out from his office window to see in which direction it is going. He may and often does see opportunities to coordinate all the forces of industrial opinion. He may and often does interpret his industry to the public or to other industries; or vice versa, he may interpret a public need to his particular industry or trade.

The business paper is largely personal journalism. In the old days newspapers were personal journals of opinion, and great editors of local journals had "followings." With a few exceptions, this type of editorial leadership has disappeared in the making of public opinion, but in the field of industrial opinion, what the editor may say about a movement within the industry, or a movement that affects the industry, has vital influence. Similarly, the technical journal provides a forum for the discussion of trade practices; this permits the best practice of the individual to meet the test of its acceptance as a basis for the universal practice of all. The columns of a technical journal provide an opportunity for a liquid interchange of thought. The whole industry shares in this opportunity for the exchange of opinion, both the manufacturer and the user. For the manufacturer has the opportunity, through the advertising columns of the publication, to follow through and capitalize the changing trade practice as discussed by the editors and contributors. The business paper has a unity differing from any other form of journalism, in that the editorial pages tell "how" and "why," and the advertising pages "what with."

The common denominator of all the forces for the making of industrial opinion, the technical school, the Government, the engineering or trade organization, and the business press, is the improvement of all industrial practice.

An unseen surge in a mysterious fluid links man to man and nation to nation

GOVERNMENTAL AIDS TO INDUSTRY

DR. JULIUS KLEIN
Assistant Secretary of Commerce

THE rapid tempo of American industrial advancement in recent years owes much to the mighty aid extended by the Federal Government in co-ordinating the activities and interests of our 120,000,000 people living in 48 commonwealths. Federal agencies have come to play an increasingly vital part in unifying American business and in giving direction to its energies. The Government has come to be looked upon as a handmaiden of business whose services touch industry at a thousand points. Under Mr. Hoover's régime as Secretary of Commerce, the policy of collaborating with industry has marked a decided step forward. This new attitude of government as a partner and co-operator, rather than as a regulator and repressor, accounts in a measure for our rapid industrial advancement.

One of the most significant facts about American industry is the remarkable increase in its efficiency. The output of the wage earners in our factories increased about 40 per cent in the six years from 1919 to 1925. This is the combined result of increased efficiency on the part of the wage earners, improved management, the application of scientific methods of research, the wider use of labor-saving machinery, and a general attention to the elimination of industrial waste. In fostering these results the Federal Government is playing an important rôle.

In the various departments of the Government there is a veritable gold mine of information and service for American industry. This mine as yet is hardly tapped—the surface is barely scratched. The Federal Government is one of the greatest fact-collectors and fact-supplying agencies in the world. All this ought to be a matter of common knowledge; but too often it is taken as a matter of course, without effective utilization of the existing resources. The truth is that our citizens are but vaguely conscious of the wide range of knowledge and services available for the asking.

A mere list of the bureaus and divisions of the Government equipped for serving industry would surprise the average citizen. The nature of the services they render, and the information that they can supply for the asking, is positively startling. Whether the question be the proper way to feed the baby or how to run a cream separator, the operation of a dredging plant or a beauty parlor, the distribution of tooth picks or locomotives, the planning of a vacation or a sales campaign—your government can supply prompt and valuable information.

The Government agency of outstanding service to industry and trade is the Department of Commerce. This embraces a wide scope of activities in its dozen separate bureaus and hundreds of subdivisions devoted to specific fields. Do you realize that this department, which has been the field of my special interest for a good many years, maintains a staff of nearly 18,000 persons? Nearly two-thirds of these are in the field; less than one-third in Washington. This great agency has an annual budget of $40,000,000 to carry on its activities at home and abroad for the service of American citizens. It includes such broad and fundamental work as that of the Bureau of the Census, which reaches out to every inhabitant of our country as it gathers the primary facts of population, manufacture, mining, and agriculture. Our Patent Office renders invaluable service to American industry in its encouragement of inventive ability and protection of the fruits of individual initiative.

Perhaps the greatest service of government to industry is the collection and giving out of information. The Washington and field staffs of the Department of Commerce are incessantly seeking facts to replace guesswork methods, to eliminate the old-time "hunch" and rule-of-thumb practices. When business men are bothered with questionnaires and requests for confi-

dential, private information—a confidence which is never betrayed—they should remember that this represents merely a means whereby the government can serve business by later giving back information which it has collected and interpreted.

Perhaps the government agency of greatest interest to the industrial engineer is the Bureau of Standards, which has accomplished marvelous results in the reduction of industrial waste through establishing uniformities and standards of practice that mean advantage both to producer and consumer. A special plan whereby industrial associations and groups may assign qualified specialists for intensive study of selected problems under the Bureau's supervision enables them to make full use of its laboratories and equipment without expense to the Government. Problems of concern to an entire industry are thus worked out, and the results become immediately available and of benefit to the whole industry, the Government, and the public. One notes, with gratified surprise, the high degree to which whole industries have set up voluntary discipline for themselves under the guidance and suggestion of such government agencies.

A kindred service is the specification work which is aimed to minimize the wastes arising from diversity in sizes, dimensions, and grades of commonly used commodities. Immense savings have thus been effected in manufacture and in the avoidance of needlessly large inventories. These are but part of the many services rendered to industry by the Bureau of Standards.

The Bureau of Foreign and Domestic Commerce is the immediate agency for fostering American trade both at home and abroad. Its trained men in the market-places of the world gather information regarding the markets for products of American industry and send current reports on conditions abroad. These men are the pioneers in our foreign outposts which reach from Tokio to Cape Town, from Scandinavia to New Zealand. In addition to the large number of foreign offices of the Department of Commerce, the extensive consular service of the State Department co-operates in all quarters of the globe. Coupled with these outposts are the district and co-operative offices in cities throughout the United States which form a *liaison* with the office desk of the American Manufacturer. Thus, the government with one hand extends its fingers to feel the pulse of a thousand consuming points abroad, while with the other hand it transmits the pulsations to American citizens.

But this Bureau cannot confine its efforts to the 10 per cent of American production which goes to foreign markets. It is finding it necessary to give increased attention to the 90 per cent of our production which is consumed in domestic trade. While the Bureau still finds its activities largely devoted to promotion of exports and to the collection and publishing of information regarding business conditions and methods in foreign countries, its domestic commerce work since 1924 has expanded rapidly. Here the effort has been focused on the elimination of waste, particularly in the field of distribution of goods from producer to consumer. The magnitude of this field may be grasped from the fact that the value of our national distribution of goods may be estimated as about eighty-five billion dollars a year. Here it has been found that the basic need was for facts which could be made available to individual business men and associated groups regarding domestic markets and marketing methods.

Basic in this program was a series of regional commercial surveys, which is planned ultimately to cover

UNITED STATES BUREAU OF STANDARDS, WASHINGTON

the entire United States, analyzing the basic income-producing activities, the facilities and methods of distribution of goods in a given geographic region. As part of the fact-presenting service for domestic commerce and industry, the Bureau published last year a statistical compilation of market possibilities for each of the more than 3,000 counties of the United States. This "Market Data Handbook" gives official data that are invaluable as a basis for determining consuming capacity of different regions and for mapping out sales programs.

Another type of fact-finding survey is a series of distribution cost studies aimed to simplify and increase the efficiency of distribution methods through stock control, cost accounting, and analyses of operating costs. Examples have been found where wholesale dealers have increased their net profits by one-third while cutting down trading territory and reducing the items carried in inventory. One large business executive in a Western State who made 85 per cent of his sales in three adjacent states found that the remaining 15 per cent of sales were made in 14 out-lying sections at an enormous loss. He confessed that he had suspected this loss but did not want to retreat from the course followed by his illustrious grandfather in building up his business.

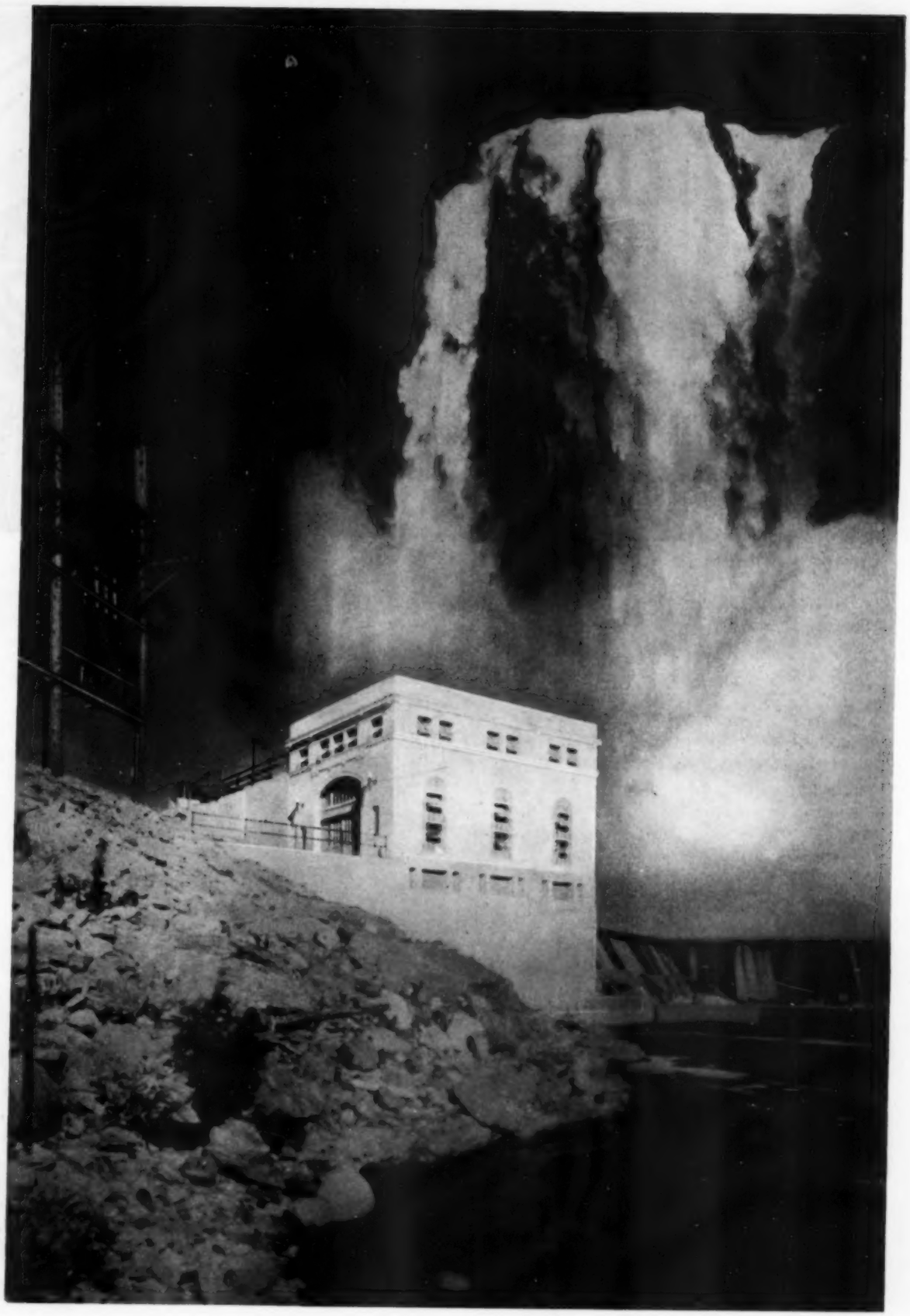
A great phenomenon in present-day business is the expansion of credit and installment selling. The extent of costs and losses in credit business have been the subject of a national survey in co-operation with the National Retail Credit Men's Association, to develop reliable information on retail credit practices throughout the country, and to provide a basis for reduction in distribution costs from this source.

With the marvelous increase in the producing capacity of American industry, the need has become increasingly greater for more careful co-ordination of production in order to maintain a better balance between supply and demand, and to eliminate the evil effects and economic wastes of over-production. When this stage is reached, American industry will have registered another great advance in the rational maintenance of prosperity. For this problem industrial surveys are being undertaken to determine the importance of such factors as obsolete equipment, management, and plant location in the producing capacity of selected lines of industry.

To many persons the Bureau of the Census is a vast statistical organization which counts the heads in the nation's population every ten years. This important primary function does not reveal the fundamental service rendered by the Census to American industry. Every two years the Census of Manufactures is taken, compiling accurate and unbiased information on the production of goods in American factories. It is a veritable mine of facts regarding the position and trends in different lines of manufacture. The Decennial Census of 1930 now being taken will for the first time gather also an entirely new body of facts regarding the distribution of commodities through various trade channels, as well as a comprehensive census of unemployment.

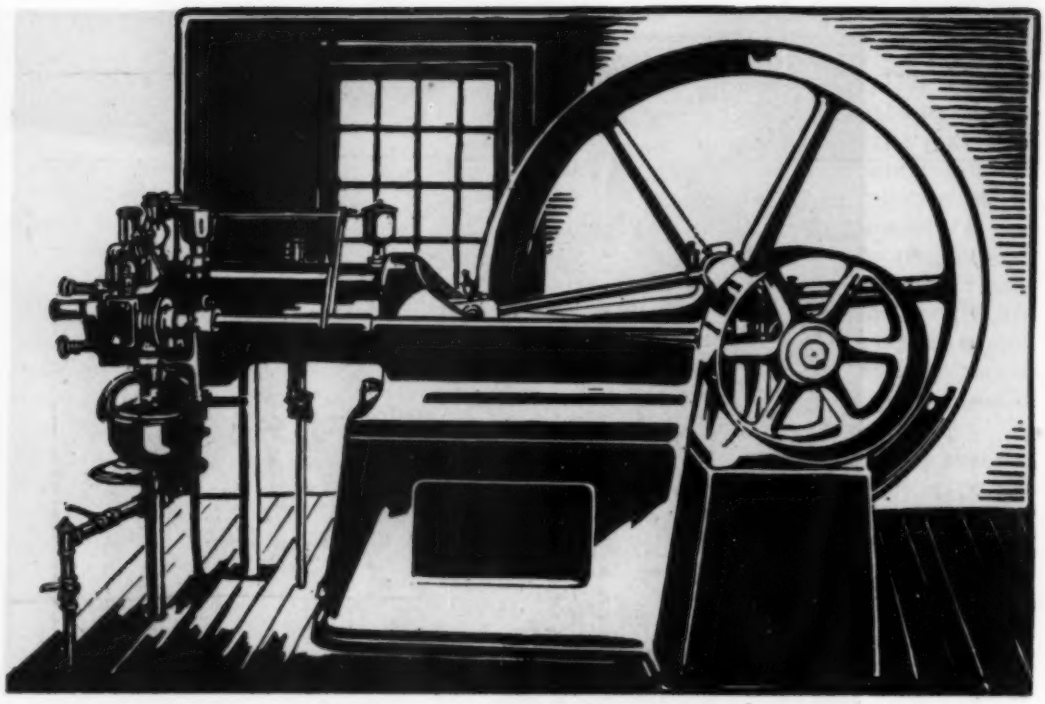
The various services centered in the Department of Commerce as here enumerated form only a portion of the far-reaching work of the Federal Government in aid of modern industry and for the advancement of our civilization. Space does not permit mention of numerous other branches of the Government which bear directly upon our commerce and industry. But mention should be made of the work of the United States Department of Agriculture in the information it issues regarding the production, grading, and marketing of agricultural commodities which are used so largely in other industries. The Federal Reserve Board makes available to the public current information regarding banking, finance and credit, commodity production, trade, and employment in each of the Federal Reserve Districts. The Bureau of Labor Statistics, Department of Labor, compiles monthly price indexes, studies of wages, and cost of living. The War Department in its Board of Army Engineers comes into contact with industry through its work in development of rivers and harbors and its administration of flood-control programs of the Government.

The agencies named are by no means the only ones whose activities bear directly upon American industry, but they show the almost limitless information provided by Government agencies for the benefit of industry, and indicate the extent to which the helping hand of Government assists in obtaining and disseminating information for the public service. The marvel of it all is that the employment of this great machinery for facilitating American industry and trade still leaves individual enterprise free to expand into ever-widening fields of activities.



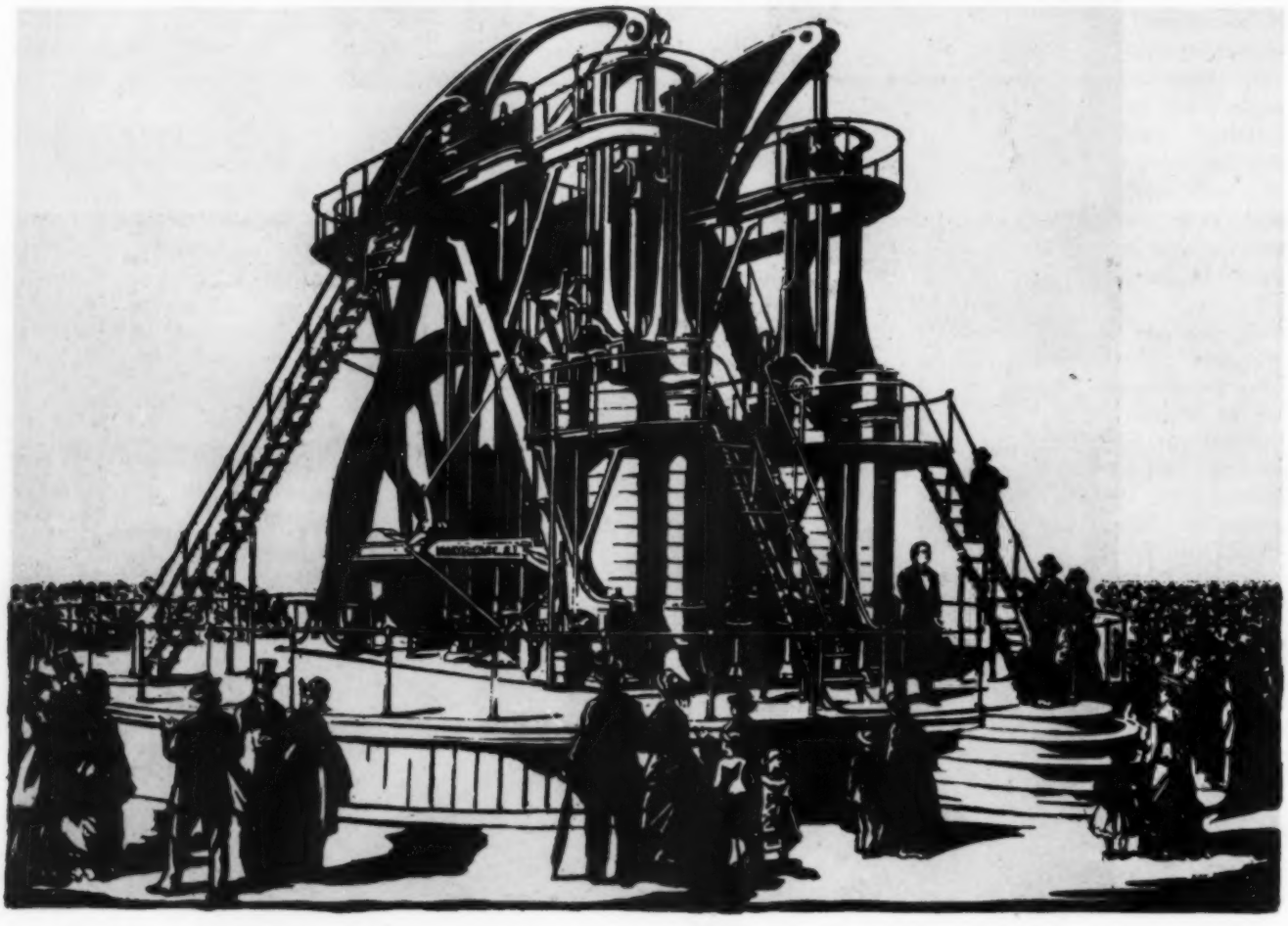
THE WATERFALL

**In rain, in steam, in ice, in stream,
in tumbling waterfall—water is
the universal solvent and servant**



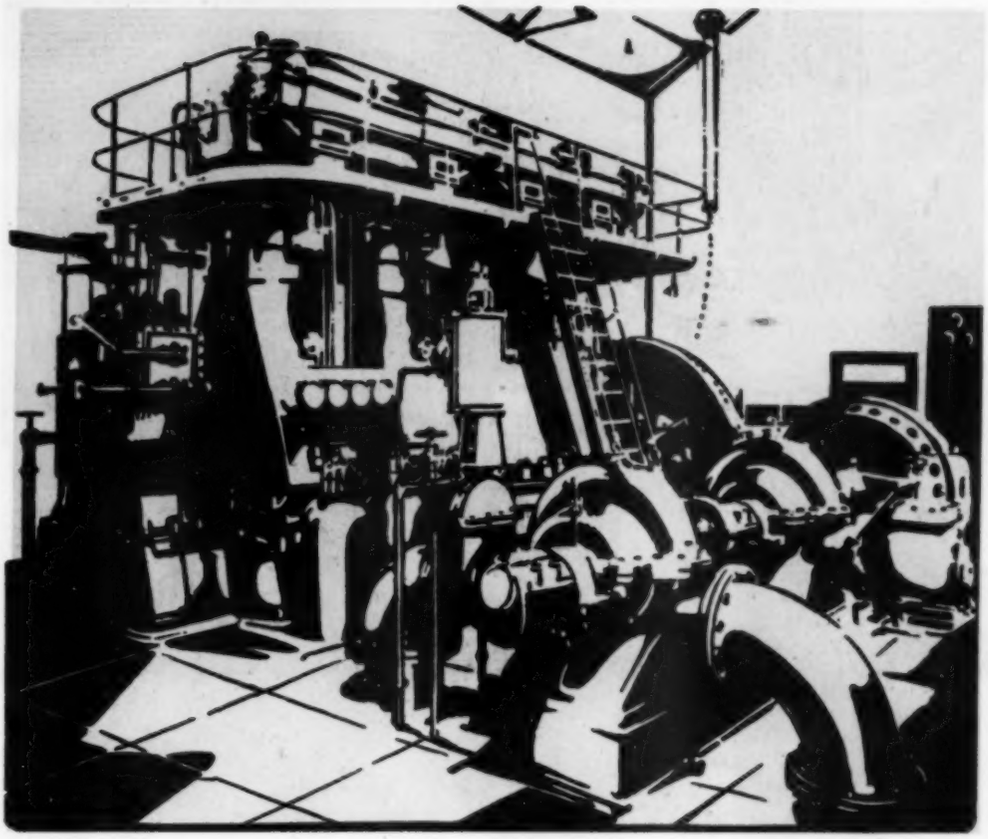
POWER IN 1880

The Otto Gas Engine opened the eyes of engineers to the potentialities of internal combustion



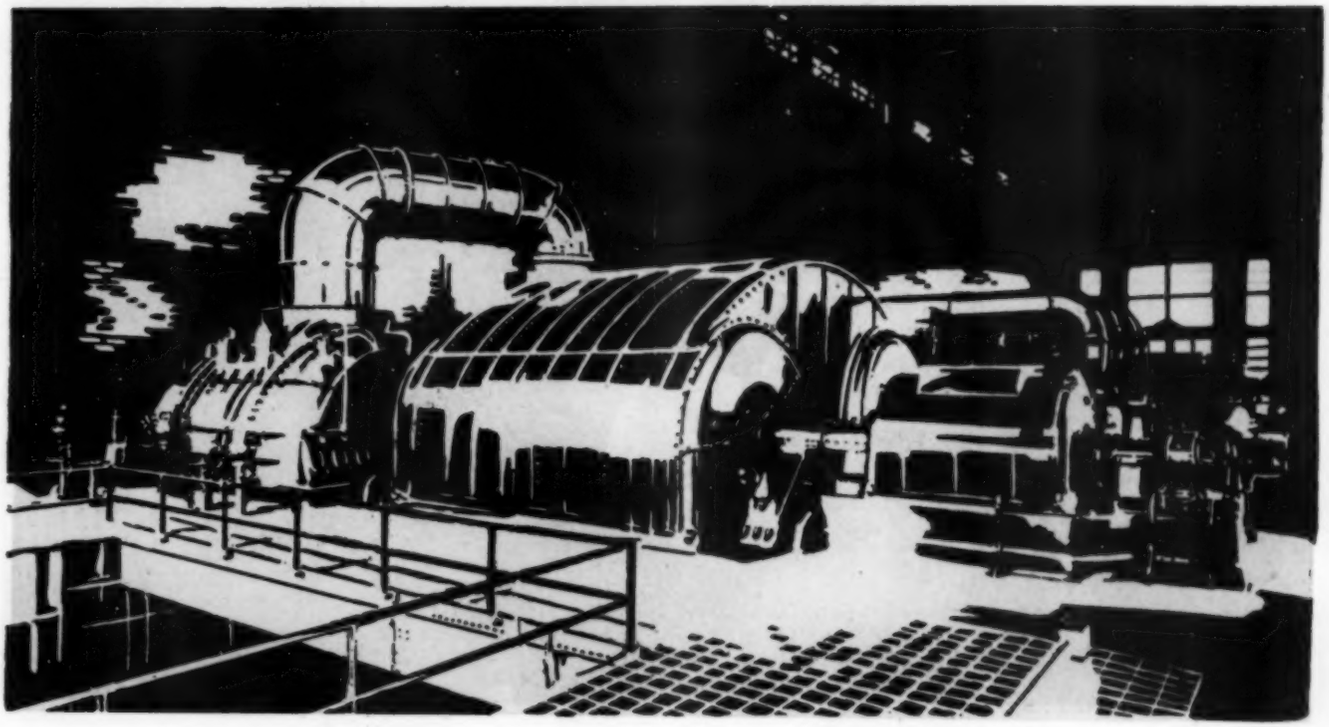
THE CENTENNIAL CORLISS

Inspiration of countless engineers. Horsepower, 2,500; weight, 1,214,000 pounds



POWER IN 1930

Capable of burning almost any oil from whipped cream to petroleum crude, the Diesel engine is the ultra-modern among prime movers



THE TURBO-GENERATOR

Horsepower, 235,000; weight, 2,600,000 pounds, the whirling "Giant of Hell Gate"

PRECISION

From sixty-fourths to hundredths to thousandths to ten-thousandths to what?

SOCIETIES AND ASSOCIATIONS

ERNEST F. DU BRUL
General Manager,
National Machine Tool Builders' Association

WERE American industry to be denied the services of its engineering societies and trade associations for just one year, no one would ever again gainsay their real importance in our economic life. Like those of the business papers, the educational institutions, and the government departments, their respective informational services are basic elements in American economic continuity and progress.

An engineering society is composed of individual members, a trade association of business concerns. But both types of organizations seek out and develop sound information on various subjects within their respective provinces, and distribute such information to their members and others. As the philosopher said: "All men learn by experience. The wise man learns much from the experience of others, but the fool learns only from his own." Both the engineering societies and the trade associations do their work for the wise man who can and will learn from the experience of others. When such organizations report the results of experience, both successful and unsuccessful, they speed progress by short cuts, and save the waste of repeating the failures that are the common preliminary steps to successful development in almost any field.

The results of experimentation must be reduced to business practice before they can benefit any individual concern, or society in general. On this account the trade association, composed of business concerns, should have antedated the engineering society, composed of individuals. But the association lagged behind the society in the volume and constructiveness of information produced. It is doubtful if there was any really constructive trade association in the mechanical field at the time of the founding of the A.S.M.E., in 1880, or for a number of years thereafter.

Even today, the American metal-working trades are far behind other industries when it comes to effective trade organization. For many years the trades of Europe have been better organized than those of the United States. In Germany alone, there are approximately eighty well organized trade associations in the machinery industry. Each one of these deals with the specific problems of its own particular industry, but all are federated into the Verein Deutscher Machinenbau Anstallten. On any question that is of interest to builders of more than one particular type of machinery, the federation acts for the whole industry.

We have no parallel organization among the machinery trades of the United States at this time, although other American industries, such as the music industry, the lumber industry, the brick industry, the paper industry, and the electrical industry, have long had similar federations dealing with the general problems of the respective industries.

As nearly as can be ascertained, there are only about twenty organized trade associations operating in the American machinery field. These represent a total membership of 1,000 business concerns of more than 10,000 concerns comprising the whole machinery business of the country.

This lack of effective organization must have held back our mechanical progress, and it would be impossible to estimate how much greater our mechanical development would be now, if our machinery trades had been more effectively organized in the past. The effective organization of the automotive industry accounts for much of its rapid and enormous development, stimulated as it was by the free interchange of information among the producing units. That industry is a shining example of the benefit of co-operative, constructive action on many problems affecting the welface of an industry as a whole. The National Automobile Chamber of Commerce has taken the lead in

the promotion of good roads; it has promoted good legislation, and has opposed bad legislation affecting automobiles; it has promoted good business policies. It is quite certain that the automotive industry would not have its present outstanding position if this co-operation had been wanting.

Now that some far-seeing executives of machinery-producing companies realize that the machinery industry of the United States needs much better organization than it now possesses, a movement has been initiated which many hope will eventually parallel the organization of the German machinery industry. Although belated, this movement should take form and gather force so that the machinery industry of the United States will be as well organized as the companion professional body, the A.S.M.E.

America's machinery contributes enormously to human welfare. Yet earnings of machinery-building companies, as shown by published reports, fall far below those of corporations operating in lines much less complex, and contributing much less to the welfare of human society. Perhaps this is because the managers of machinery companies are more concerned with production and design than they are with making money. But the risks of their business are greater than those of businesses having more stable demand, and scientific business management should be able to take due account of these risks in setting prices and insuring profitable operations.

It is curious that American machine shops have probably used the principles of scientific production management far more than other industries, yet their neglect of scientific management on the commercial side has been notorious for many years. Deficiency in the business administration of machine-building companies is shown by scanty earnings. This situation is a challenge both to the trade associations and to the engineering societies dealing with management problems in the mechanical field.

The inventive genius who is a poor business man is one of the stock characters in plays, novels, and other literature. Though one's heart is supposed to go out to him, he really deserves scant sympathy. If the average rate of reward for the creative producer of machinery is low, it is a result of his own neglect of the business side of his profession.

Those who have studied the possibilities of co-operation through trade associations and engineering societies are almost always struck by the fact that so much more can be done in the future than has ever been done in the past. With better co-operation, the next fifty years could advance civilization much further and much faster than the last fifty.

Some people seem to think that the age of invention and mechanical progress must be close to an end, that we have invented about everything that is ever going to be invented, but the rate of issue of patents ought to be proof enough that this idea is fallacious. Although many of these patents contribute nothing to the general welfare of humanity, those that are put to practical use show that we are very, very far indeed from the limits of invention. Wherever a considerable amount of muscle power is used in producing a considerable quantity of goods, there is bound to be room for the further exercise of mechanical ingenuity in devising machines to relieve and eliminate drudgery. The combined talents of electrical and mechanical engineers will do enormously more in the future than in the past.

One man's engineering work forms the foundation and gives the stimulation for others to go beyond him. The informational services of the engineering society and the trade association expand men's visions of opportunities, technically and economically. If we can judge the future by the past, there seems to be no limit to the things that men will eventually conceive and bring forth. And the welfare of the human race all over the world will be enhanced continuously by the activities of the societies and the associations. Therein lie their ultimate values and justification.

ENGINEERING SOCIETIES BUILDING

THE ZMC-2

Iron boats in water, Alclad ships in air—both subject to one unchanging law

WHAT IS NOT YET MAY BE

THE A.S.M.E. FIFTIETH ANNIVERSARY MEDAL

AUGURIES OF THE FUTURE

TO PROPHESY all the tremendous strides taken by engineering during the fifty years since the founding of the A.S.M.E. would have been impossible in 1880; the prophet could not and would not have been believed. Though forecasts of the future may be equally impossible in 1930, nine chief editors of the McGraw-Hill group of technical publications have consented to essay the rôle of prophet. Their brief auguries, here following, are significant of a new type of editorial approach and engineering vision

POWER

ELY C. HUTCHINSON, EDITOR

WHAT can one predict regarding the future of power? What dare one predict?

Continued evolution of the steam boiler and turbine for decades to come? One cannot be sure. As late as 1900 the reciprocating steam engine seemed the only worthwhile prime mover for large capacities. Continued extension of Diesel engine applications? Yes, unless there are revolutionary advances in other methods of power generation.

Gas turbines? Perhaps. Binary-vapor combinations, such as the mercury vapor plant? Possibly. Higher steam pressures and temperatures in plants operating along present lines? It seems certain that steam pressures above 1,000 lb. will become increasingly common; higher steam temperatures will come in as fast as the metallurgist will furnish the necessary materials. Even today steam can be (and is in one instance) generated at the critical pressure of 3,200 lb. per sq.in.

Combined production of city gas, central steam, electricity, and bulk chemicals in a single intricate plant? Large-scale and long-distance transmission of gas from fuel fields to power centers? A continuation of pooling central-station power with that generated as a byproduct of industrial process steam? Almost certainly.

Continued development of water power? Yes, for many years, but soon at a decreasing rate, as the remaining undeveloped aggregate of available water power decreases. It is simply a matter of arithmetic. Sun power? Tide and wave power? Wind power? All these are mechanically workable. With the possible exception of tidal development in a few favorable localities, none gives today any promise of early economic application on a large scale.

Centuries hence, when our native fuel is running low, man will be faced with the problem of getting new energy from the sun to supplement his meager water-power resources. When that day comes he will doubtless be prepared. Accelerated photo synthesis in vegetation, or in fuel factories, may be one solution. Or the direct production of electricity from heat, long ago accomplished on a minute scale, may have been made economical. Even the temperature differences existing between the frigid atmosphere of Polar regions and the great masses of water beneath the ice packs may conceivably be utilized.

Finally, although we are less hopeful now than a few years ago, the unlocking of atomic energy still remains a remote possibility. One thing, however, I venture to predict without qualification. That is, ceaseless change and development for years to come.

AVIATION

The Oldest American Aeronautical Magazine

EDWARD P. WARNER, EDITOR

I WRITE as a dissenter and a conscientious objector to the accepted school of prophecy. It is the fashion to predict airplanes of enormous size, carrying hundreds of passengers, and journeying at three hundred miles an hour. Such things may come—almost any scientific miracle may happen if it does not openly defy natural law—but the aircraft that cruises at three hundred miles an hour or better will not be similar to the present airplane, even in general principle. For future additions to speed and size we must look almost as much to larger and smoother airports as to revolutions or revelations in airplane design.

Airplanes of larger sizes will continue to be built, but the really giant machine, always laboring as it must under the threat of the inherent structural inefficiency that goes with enormous size, remains a delightful fantasy. With few exceptions, the largest planes thus far built have been disappointing to the fond hopes of the interested public, if not to their constructors.

Progress lies (always conceding the possibility of some radical inventive innovation that will change the whole picture and that has not yet appeared) in less spectacular directions. Thirty years hence, it should definitely be easier to fly than to drive a car today. If not, it will be because the aircraft industry has failed to measure up to its responsibilities. At least fifty per cent of all long-haul passenger travel, and eighty per cent of all first-class mail dispatched over three hundred miles, should go by air. These future common-places demand no miracles. Aviation needs only a permanent state of discontent and a persistent introspection on the part of the aircraft industry plus a gradual acclimatization of the general public.

Engineering News-Record

F. E. SCHMITT, EDITOR

WHO will venture to say what the future of civil engineering may be? Yet the trends of the present when set alongside the changes that have come since 1880 reflect some suggestive possibilities.

Present trends include: first, strong activity in the de-

velopment of metals; second, a powerful growth of research and effective application; third, phenomenal increase in magnitude, boldness, speed and sureness of construction operations, making possible the erection of a Hudson River bridge spanning three-fourths of a mile, a Boulder Dam six hundred feet high, tunnels and subways of remarkable size and difficulty. In addition to these trends one may discern a definite beginning of chemical influence upon the arts underlying civil engineering—in alloys, lacquers, wallboards, and plastics.

With the continuing operation of these factors of progress the civil engineer's work is certain to grow and to be transformed. Construction equipment is being intensively developed. Much larger and more difficult work will be required—and will be possible. Development in the field of metals is such that the relative stagnation of decades may be replaced by epochal advances. Chemistry may open new avenues of progress by providing materials as yet undreamed of.

Beyond doubt the most powerful of these growth factors is the amazing extension of the wants of mankind. Even more is demanded in speed and convenience of transportation. City transportation is creating tremendous works, and will do so on vaster scales in the future. Domestic service is climbing rapidly to higher levels; sanitation alone, in water, sewerage, and refuse, faces marvelous development. Structural demands are moving into new dimensions. In such growth lies a future whose precise proportions cannot fairly be forecast. But past and present afford sure guaranty that the civil engineer's achievement will remain abreast of all human need.

Textile World

DOUGLAS G. WOOLF, EDITOR

THE last decade has produced revolutionary trends in the textile industry which undoubtedly will be translated into revolutionary developments in the next half-century. These trends have been primarily economic in inception. Briefly, the industry is passing from a stage where production considerations have been paramount, to a phase where impulses come from the consuming end. No longer can mills sell what they care to produce; they must produce what they can sell.

The potential effects of this change are far-reaching. Flexibility in a mill's product, equipment, layout, and organization is demanded. Mills must anticipate style changes—and be the beneficiaries, rather than the victims, of them.

This merchandising responsibility, however, does not lessen manufacturing responsibility. On the contrary, it intensifies it. Scientific study and adjustment of mill jobs must go forward. A start has been made in the direction of so-called "stretch-out," or labor extension methods, but the surface has barely been scratched.

Reduction in the number of steps in the preparatory and spinning processes offers another fertile field for study. Here, too, a start has been made through such innovations as single-process picking and long-draft spinning.

The remarkable development of synthetic fibers is another noteworthy trend. Their use is in its infancy. Synthetic fibers have one outstanding advantage—uniformity. Man can mould them to his own desire. The practically complete replacement of natural fibers by synthetics during the next half-century is entirely within the realms of possibility. From every standpoint, the next half-century in textiles promises to be as thrilling as was the 50-year period which included a great part of the transition from hand to power manufacture.

CHEMICAL & METALLURGICAL ENGINEERING

S. D. KIRKPATRICK, EDITOR

IN LESS than ten years I have seen the "borders of the impossible" pushed back until such achievements as the production of oil by the liquefaction of coal become merely the datum points for further research. Synthetic products—nitrates from the air, rayon, lacquers, solvents, plastics—have become, one after another, commonplace articles of commerce. What are the trends of chemical engineering for the future?

Of outstanding importance are the great advances in the methods of synthesis. Flexible, non-breakable glass is just around the corner. Synthetic resins made from farm wastes and industrial byproducts threaten to displace wood and other material in molded furniture, automobile bodies, hardware, and machinery. Discovery of new catalysts may make coal or petroleum the cheapest of chemical raw materials for alcohol and other solvents. The huge industry built on coal-tar is already threatened by the technology of high-pressure synthesis.

This steady tendency toward the use of extremes of pressure and temperature greatly accelerates the potentialities of chemical processes. Pressures as high as 15,000 lb. are in common use in nitrogen fixation. Temperatures of 1,000 deg. F. are met in petroleum units, and in the catalyst chambers of ammonia converters. Electric induction furnaces operate at temperatures of 3,000 to 3,500 deg. F., due largely to improvements in the quality of the refractories. Even more striking progress has been made in developing the corrosion-, heat-, and abrasion-resistant alloys. The time is coming—perhaps within the next decade—when some one of these alloys will replace steel in practically all of its major uses. The stainless alloys of today are but encouraging portents of the ideal and universal metal of the future. I am confident that chemical engineering will play an increasingly important rôle in our civilization.

ELECTRICAL WORLD

L. W. W. MORROW, EDITOR

WHAT of the future? There is little doubt that industry will use electricity in greater quantity, but it is in new forms and applications that it has its greatest opportunity to aid industrial progress. There will be better motors and better lighting, but the increase in efficiency cannot be great and will not influence the cost of manufacture appreciably. This cost is even now a small per cent of any manufacturing cost.

It is the invention of new machines and control devices that offers hope for increasing the economic efficiency of manufacture. It is not a wild dream to visualize the application of the vacuum tube to manufacture—to control, to signalling, to rectifying, to power. This new child of the radio art is being studied seriously, and no one can yet measure its future possibilities. Promise also lies in the realm of electro-chemistry and electro-metallurgy. Chromium plating has been placed upon a commercial basis

and has stimulated research along all plating lines. The airplane has stimulated electro-metallurgical researches, and it may be that new alloys and rare metals such as beryllium will be placed within reach of industry. The full possibilities for the use of electric furnaces, electric heat-treating, and electric welding are by no means reached; there is every reason to believe that present apparatus and practice are merely crude pioneering developments.

A new and interesting field of exploration lies in the study and use of electrically ionized gases. The neon tube is but a start. Already we have new conceptions of the electric arc, whereby for low voltages at least, oil can be eliminated from circuit interrupting devices. With vacuum tube control and with the characteristics of charged gases better known, there may be many new tools for metal working that will revolutionize plant practices. There is little doubt that industry will gain greatly through new and better uses of electricity and electric equipment.

Engineering and Mining Journal

ARTHUR ALLEN, EDITOR

IN THE broad field covered by mining engineering, the trend is toward the wider application of electricity, underground or on the surface—the use of direct motor drives and gear reductions—modifications in ore crushing units to reduce power and to diminish wear—improvements in feeding, conveying, and hoisting equipment that demonstrate the advantages of motor power of the most efficient kind. Compressed air is still used extensively in mining operations. Its irreplaceability has stimulated significant improvements in the design of air drilling tools.

Metal mining is an old art; metallurgy, an ancient science. Both are well out of their swaddling clothes. The application of intensive research, particularly in recent years, has cheapened production. Mechanization has reduced labor requirements. Electrification has simplified operations, and increased output. The technique of metal recovery has reached so high a plane that its fundamentals are being borrowed freely by other industries, notably the chemical industry and the non-metallic industries.

Though industrial depression and low commodity prices have affected the mining industry, its future is secure in the manifold needs of mankind.

electronics
electron tubes—their radio, audio, visio and industrial applications

O. H. CALDWELL, EDITOR

ALONG came radio broadcasting, and the once erratic vacuum tube evolved into a dependable, accurate electrical tool. Later, with its cousin, the photo-electric cell, the vacuum tube became the heart of talking pictures. And now the tiny tubes of the past are evolving into great power units capable of handling hundreds of kilowatts. Power and motor applications of electronics are growing rapidly, and the tube is finding a thousand unexpected and astounding uses.

What will this new science of electronics do for the world in the future? That is hard to predict; but here are some hints. Our lights will all be turned on automatically at the approach of darkness. Our telephone and electric wires will bring us broadcast music and entertainment. Television will come but perhaps over wires. We shall be sounding the depths of the universe with new types of telescopes. In the other direction, looking toward the minute, we shall extend our present scale of electronic measurements, which today can caliper a faint star and detect its transmitted heat, or can indicate electric currents down to the one-quintillionth part of an ampere, or 10^{-17}. Our movies, all talking, all in colors, and all "wide measure," will have "binaural sound" effects, giving us true acoustic depth and reality. Elaborate new musical instruments will employ electronic-tube oscillators.

In the power field we shall be transmitting high-tension direct current instead of alternating current. Tubes will convert from a.c. to d.c. and from one frequency to another. Tubes will replace high-tension switches, circuit breakers, and lightning arresters. Within 20 years we may even be transmitting our energy over high-frequency radio beams. Who can say? Airplanes may be taking their power from such beams, which will also guide them. (This may sound the height of absurdity in 1930 and would not be seriously mentioned here, were it not for the fact I have recently heard two of the sanest and most fruitful engineers in the country, each with world miracles to his credit, independently and confidentially propose the early possibility of this very thing!) Tubes will effect revolutionary changes in our food supplies, particularly in food preservation.

The high-frequency outputs of vacuum tubes will be major factors in eliminating certain diseases from the human family. Already they can control hereditary changes and can shape the evolution of species; they may even predetermine sex. In fact the sweeping changes which the electronic tube will effect upon the life of the human race may very probably cause this period to be known as "The Electronic Age."

American Machinist

K. H. CONDIT, EDITOR

SIDE by side with the development of ever more highly specialized machinery for mass production in big shops, I seem to foresee more versatile machines for small shops, machines on which a greater variety of operations may be performed with one set-up. Precision will become ever more precise, yet more rationally employed. Automatic inspection will go hand in hand with automatic assembly, and the gains made by efficient tooling will be conserved.

Already the metal-working shops have been called upon to machine vulcanites and plastics; the next call will come from ceramics and glasses. Aluminum alloys, chromium, magnesium, beryllium alloys—any of them may become more common than steel. The drawing press, the permanent mold, and welding will further invade the sandy preserves of the foundry. Heat-treatment may possibly give way to electronic treatment.

Centralized research laboratories will make available to small shops, facilities and scientifically intuitive minds equal to those in the giant industries. Management should become more scientific, more human, and thus more resultful. The use of obsolete equipment may actually become a cardinal industrial sin.

Whatever may evolve in the twin fields of engineering and pure science, the record of the metal working industries should justify the prophecy that they will be found ready to build it. It should never be forgotten that men and shops employing the arts of Vulcan antedated, fostered, and made tangible the infinitely varied devices and processes underlying twentieth century civilization. Without these men and shops, such devices and processes would still be improbable dreams.

In 1930, as in 1880, and on into the Zenithless Future, the Story of the Metal-Working Industries is the Story of Machines and Men

NEWS OF THE WEEK

PROGRAM . . .

A.S.M.E. Fiftieth Anniversary Celebration

Saturday, April 5

New York City

8:30 A.M. Registration and Presentation of Credentials
Engineering Societies Building

9:20 A.M. Unveiling of Fiftieth Anniversary Memorial Tablet
Engineering Societies Building Lobby

10:00 A.M. Anniversary of Preliminary Meeting
Offices of American Machinist, *McGraw-Hill Building*

12:00 M. Luncheon—Guests of McGraw-Hill Publishing Company
McGraw-Hill Building

Hoboken, New Jersey

2:30 P.M. Anniversary Pageant Commemorating Organization Meeting
Auditorium, Stevens Institute of Technology

4:30 P.M. Second Performance of Anniversary Pageant

New York City

7:30 P.M. Welcoming Dinner—Auspices Metropolitan Section
Hotel Roosevelt

Sunday, April 6

New York City

11:00 P.M. Special Commemorative Services
Cathedral of St. John the Divine

Monday, April 7

Washington, D. C.

10:00 A.M. Welcoming Assembly
National Council Chamber, U. S. Chamber of Commerce Building

2:00 P.M. Session, Part I, "Influence of Engineering Upon Civilization"
National Council Chamber, U. S. Chamber of Commerce Building

9:00 P.M. Reception by Officers and Council of the Society
Mayflower Hotel

Tuesday, April 8

Washington, D. C.

9:30 A.M. Session, Part II, "Influence of Engineering Upon Civilization"
National Council Chamber, U. S. Chamber of Commerce Building

12:30 P.M. Founders' Luncheon
Mayflower Hotel

3:00 P.M. Convocation for Conferring of Honors
National Council Chamber, U. S. Chamber of Commerce Building

7:00 P.M. Fiftieth Anniversary Formal Dinner
Mayflower Hotel

Wednesday, April 9

Washington, D. C.

9:30 A.M. Simultaneous Excursions
Points of Interest in and around Washington

2:00 P.M. Simultaneous Excursions
Surrounding Cities and Points

4:30 P.M. Reception at the White House

ACKNOWLEDGMENT

THE editors wish to thank everyone of the distinguished contributors, whose names appear with their articles, for their painstaking co-operation in the publication of this A.S.M.E. Golden Anniversary Number of *American Machinist*, and in addition to render grateful acknowledgment to nineteen firms, magazines, and individuals who have furnished photographs, data, or access to their plants for special illustrations: Allis-Chalmers Manufacturing Corporation; American Locomotive Company; American Rolling Mills Company; "Aviation;" W. F. and John Barnes Company; C. O. Bartlett & Snow Company; E. W. Bliss Company; Camp Photographer, Camp Meade, Md.; "Electrical World;" Ford Motor Company; Keystone View Company; Lincoln Electric Company; Linde Air Products Company; North German Lloyd Line; "Power;" A. O. Smith Corporation; Underwood and Underwood; U. S. Navy Publicity Bureau; Western Union Telegraph Company.

Outstanding was the assistance rendered by Miss Selig, Miss Parker, and Mr. Calvin W. Rice of the American Society of Mechanical Engineers.

Within the McGraw-Hill Publishing Company (and attached to departments other than that of *American Machinist*) exceptional co-operation has been given by: J. A. Lucas, Art and Photography; B. Z. Reiter, Art and Layout; J. Holland, Typography; E. Ehrmann, Engravings; B. O. Wieting, Cover Layout; H. B. Bettersworth, Cover Drawing; T. S. Walling, L. Brucker, C. Marchal, F. Wilding, M. P. Lacks, J. Carr, J. Williams and H. Gardner, Composition and Printing.

Some months ago W. W. Dodge, C. G. Smith, and E. J. Tangerman were designated to carry this number through to completion. The editors wish to commend them and all other members of the *American Machinist* staff collaborating for their initiative and wholehearted co-operation.

Editor and Publishing Director

PERSONALS

GASTON L. P. DE BETHUNE, member of the A.S.M.E. and representative of the Federation of the Associations of Belgian Engineers at the A.S.M.E. Golden Anniversary observances, is to be awarded the Fiftieth Anniversary Medal of the A.S.M.E. for Belgium.

A. L. BETTY, formerly of the Axelson Aircraft Co., Maddux Air Line, and West Coast Air Transport, has joined the Varney Air Lines as motor expert in charge of all the company's motor work.

FRANK W. CALDWELL, chief engineer, Standard Steel Propellor Co., delivered a paper on "The Drop-Forged Metal Propellor" at the Pittsburgh aeronautic conference on March 12, sponsored by the A.S.M.E. and the newly formed Aeronautic Section of the Engineers' Society of Western Pennsylvania.

GEORGES CLAUDE, well-known French scientist and inventor, member of a number of technical societies, and possessor of many decorations for his contributions to science, is the Fiftieth Anniversary Medallist from France, and will deliver the monograph from that country at the A.S.M.E. celebration in Washington.

DEAN MORTIMER E. COOLEY, past president of the A.S.M.E. and dean emeritus of engineering at the University of Michigan, was presented the Washington Award of the Western Society of Engineers at a dinner meeting of that organization and the four national engineering societies in Chicago recently. The award is given for "accomplishments which pre-eminently promote the happiness, comfort, and well-being of humanity."

PROF. DANIEL DRESDEN, president of the Jaffa Engine Works, Utrecht, Holland, and consulting engineer of note, will be A.S.M.E. medallist from Holland at the Golden Anniversary observances.

WILLIAM ELMER, of the Pennsylvania Railroad Co., PROF. R. H. FERNALD of the University of Pennsylvania, and HOWARD A. HOFFER of the U. S. Cast Iron Pipe & Foundry Co., have been appointed representatives of the A.S.M.E. for the 34th annual meeting of the American Academy of Political and Social Science, to be held at the Bellevue-Stratford Hotel, Philadelphia, on May 2 and 3.

WILLIAM L. EMMET, consulting engineer with the General Electric Co., will be awarded the A.S.M.E. medal by PRES. CHARLES PIEZ at the Golden Anniversary Observances for his contributions in the development of the steam turbine, electric propulsion of ships, and other electrical generating apparatus.

LUDWIG ERHARD, director of the Technical Museum in Vienna, honorary member of the Technical University of Vienna, and president of the Austrian Society of German Engineers, will deliver the monograph for Austria at the Washington session of the Fiftieth Anniversary of the A.S.M.E.

WILLIAM L. EMMET

DR. ROBERT H. FERNALD, Whitney professor of dynamical engineering and director of the mechanical engineering department at the University of Pennsylvania, has been appointed dean of the Towne Scientific School of the University, according to a recent announcement by Provost Josiah H. Penniman. He is a former vice-president of the A.S.M.E.

CARL EWALD GRUNSKY, consulting engineer of San Francisco and former member of the Panama Canal Commission, will deliver the monograph for the United States at the A.S.M.E. Golden Anniversary Celebration.

T. HILL has been appointed sales manager of the Detroit Gray Iron Foundry Company.

E. L. IVES, vice-president of H. A. Brassert & Co., Chicago, consulting engineers, has sailed for England on a business trip.

MASAWO KAMO, head of the department of mechanical engineering of Tokyo Imperial University, is the A.S.M.E. Fiftieth Anniversary Medallist from Japan.

ARMEN S. KURKJIAN, sales manager, Oliver Machinery Co., Grand Rapids, Mich, has been appointed chairman of the A.S.M.E. special research committee on saws and knives.

DR. IRVING LANGMUIR, associate director of the research laboratory of the General Electric Co., will receive the Willard Gibbs gold medal of the Chicago Section, American Chemical Society, for 1930, according to a recent announcement by Dr. W. V. Evans of Northwestern University.

JAMES H. LATHAM, formerly an export official for the General Motors Corporation, has been appointed export manager of the Peerless Motor Car Corporation, Cleveland.

F. A. LORENZ, JR., assistant vice-president in charge of operations for the American Steel Foundries, Indiana Harbor, Ind., has been appointed general manager of both the Indiana Harbor and Pittsburgh works, in charge of sales and production.

E. L. LUDVIGSEN has been appointed general sales manager of the Fuller & Sons Manufacturing Co., Milwaukee, a division of the Unit Corporation of America, West Allis, Wisconsin.

LUIGI LUIGGI, senator of the Kingdom of Italy, and noted engineering authority of his country, will deliver the monograph for Italy at the A.S.M.E. Fiftieth Anniversary observances.

CONRAD MATSCHOSS, director of the Verein deutscher Ingenieure, historian of the development of the steam engine, and a life member of the A.S.M.E., will deliver the monograph from Germany at the Fiftieth Anniversary celebration.

JOSEPH W. ROE

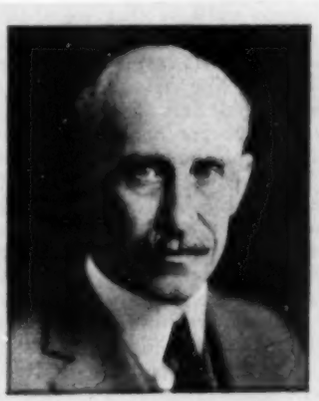
FRED J. MILLER, former editor of *American Machinist*, and past president of the A.S.M.E., will be awarded the Gantt Medal by LEON P. ALFORD, chairman of the Gantt Medal Board, at the anniversary observances in Washington of the A.S.M.E. The award will be made for "distinguished achievement in management."

BRIG.-GEN. CHARLES H. MITCHELL, dean of the faculty of applied science and engineering at the University of Toronto since 1919, and president of the Engineering Institute of Canada for 1929, will receive the Fiftieth Anniversary Medal of the A.S.M.E. for Canada. He is the author of numerous treatises and articles on aerial navigation, hydroelectric development, and hydraulic power.

VILHELM F. A. NORDSTROM, technical manager of the De Laval Steam Turbine Co., and Swedish delegate to the Conference of the International Electrotechnical Commission in New York in 1926, will represent Scandinavia at the A.S.M.E. observances in Washington.

LOUGHNAN ST. L. PENDRED, president of the Institution of Mechanical Engineers, Great Britain, and an honorary member of a number of other engineering societies and organizations, will be the recipient of the A.S.M.E. Fiftieth Anniversary Medal for Great Britain.

JOSEPH W. ROE, professor of industrial engineering at the New York University, will be presented with the Melville Medal of the A.S.M.E. at the Anniversary Observances in Washington. The medal is endowed by the late Rear Admiral George W. Melville, an honorary member and past-president of the Society, for "an original paper or thesis of exceptional merit, presented to the Society for discussion and publication." Mr. Roe's paper was entitled "Principles of Jig and Fixture Practice."

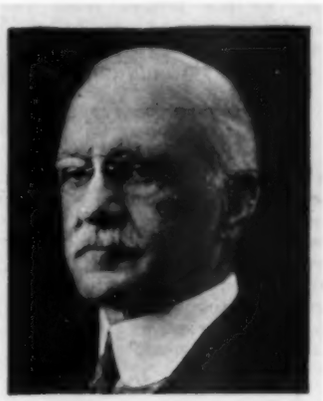


ORVILLE WRIGHT

W. M. SCARTH, formerly assistant specification engineer for the General Motors Co., Oshawa, Ont., has resigned to become assistant research engineer for the Auburn (Ind.) Automobile Company.

AUREL STODOLA, professor of mechanical engineering at the Swiss Federal Technical University, Zurich, Switzerland, from 1892 to 1929, and distinguished author and engineer in the field of heat engines, will represent Switzerland at the A.S.M.E. Fiftieth Anniversary Celebration.

JAMES M. TODD, consulting engineer of New Orleans, La., was recently installed as president of the Louisiana Engineering Society. Mr. Todd served as vice-president of the A.S.M.E. last year and is a member of the board of directors.



FRED J. MILLER

SIDNEY WASLEY, formerly manager of the Youngstown (Ohio) district sales office for the Mathews Conveyer Co., Ellwood City, Pa., has been placed in charge of the Pittsburgh district sales office. He succeeds F. M. FISH, resigned.

C. O. WEISSENBURGER, for 13 years vice-president and general manager of the Marietta Manufacturing Co., Point Pleasant, W. Va., has been elected president to succeed the late Walter A. Windsor.

G. F. WILSON has been named district sales manager at Philadelphia by the Associated Alloy Steel Co., Union Trust Bldg., Cleveland. His headquarters are at 1834 Lewis Building, Philadelphia.

JOSEPH G. WORKER of the American Engineering Co., Philadelphia, has been elected chairman of the Electric Hoist Manufacturers Association for 1930.

ORVILLE WRIGHT, inventor and constructor, with his brother, of the first successful engine-propelled airplane, will be awarded the Guggenheim Medal "for notable achievement in the advancement of aeronautics" by WILLIAM F. DURAND, president of the Guggenheim Medal Board, at the Fiftieth Anniversary Observances of the A.S.M.E. in Washington.

MEETINGS

AMERICAN WELDING SOCIETY—Annual meeting at Society headquarters, New York City, April 22-25. M. M. Kelly, 33 West 39th St., New York, is secretary.

NATIONAL MACHINE TOOL BUILDERS' ASSOCIATION—General Cost Conference at Hotel Cleveland, Cleveland, Ohio, April 22-23. E. F. DuBrul, 1415 Enquirer Bldg., Cincinnati, is general manager.

NATIONAL POWER SHOW—Held in connection with the International Textile Exposition, Mechanics Bldg., Boston, Mass., April 28 to May 3. For information write to New England Association of Commercial Engineers, 53 Devonshire Road, Boston.

AMERICAN FOUNDRYMEN'S ASSOCIATION—Annual Convention, Cleveland Public Auditorium, Cleveland, Ohio, May 12-17. C. E. Hoyt, 222 W. Adams St., Chicago, is secretary-treasurer.

NATIONAL FOREIGN TRADE COUNCIL—Convention at Hotel Biltmore, Los Angeles, May 21-23. O. K. Davis, 1 Hanover Sq., New York, is secretary.

SOCIETY OF AUTOMOTIVE ENGINEERS—1930 Summer Meeting, French Lick Springs Hotel, French Lick Springs, Ind., May 25-29. National headquarters are at the Engineering Societies Bldg., 29 W. 39th St., New York City.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS—Semi-annual meeting, Hotel Book-Cadillac, Detroit, June 9 to 12. Calvin W. Rice, 29 West 39th St., New York, secretary.

NATIONAL ASSOCIATION OF FOREMEN—Convention at Toledo, Ohio, June 6-7. Harry J. Baumker, 316 Tenth St., Toledo, is convention secretary.

STEEL INDUSTRY'S EXECUTIVES—Annual Iron & Steel Exposition. Under the sponsorship of the Iron & Steel Electrical Engineers, June 16-20, Broadway Auditorium, Buffalo, N. Y. John F. Kelly, 1010 Empire Bldg., Pittsburgh, Pa., is managing director.

AMERICAN SOCIETY FOR TESTING MATERIALS—Annual meeting, Haddon Hall, Atlantic City, N. J., June 23-27. C. L. Warwick, 1315 Spruce Street, Philadelphia, is secretary-treasurer.

STEEL FOUNDERS' SOCIETY OF AMERICA—Semi-annual convention. Greenbrier Hotel, White Sulphur Springs, Va., June 26-27. G. P. Rogers, 932 Graybar Bldg., New York City, is managing director.

BUSINESS · BAROMETER

A.S.M.E. and kindred societies are major forces in combating industrial ignorance

By THEODORE H. PRICE
Editor, Commerce and Finance, New York

AT ABOUT the same hour each night a little boy woke up shrieking in terror. He explained that he had seen a terrible tiger in his dream, and that he was afraid he would be eaten alive. Loss of sleep and the recurring fearsomeness of his experience began to affect his health.

The doctor was called in, and the doctor sent for the psychologist. Taking the boy in his arms the psychologist said, "Sonny, they tell me that you see a tiger each night after you have gone to sleep; it that so?" "Yes," said the little fellow, "and he's terrible." "No, he isn't terrible," said the psychologist, "When he comes to you tonight, just put out your hand, shake him by the paw, and say, 'Good old tiger, I'm glad to see you.' You will find he won't do you any harm."

The little fellow said he would try to do as the psychologist suggested. He went to bed, and after he had fallen into a nervous sleep the psychologist entered the room, and sat at the foot of his bed. In about an hour the child was seen to put out a tremulous hand and in a quavering voice said, "Good old tiger, you won't hurt me, will you?" The little boy woke up shouting with glee, "He didn't hurt me after all," and the tiger of his dreams had no further terror for him.

This is an abbreviation of a story told in a sermon recently preached by the Reverend Dr. Harry Emerson Fosdick. Dr. Fosdick used it to illustrate the unreality of the difficulties which seem to stand in the way of moral progress. The little boy and the terrifying tiger of his dreams are, however, to be found everywhere, and the business man who can learn to shake his tiger by the hand and dismiss him as a phantasm has a great advantage.

No one who will look back over the last fifty years can fail to be impressed by the harmlessness of the many economic terrors that have been feared during that time, and this should be particularly true of the machine industry while it is celebrating the fiftieth anniversary of the founding of the American Society of Mechanical Engineers. In the great economic and engineering progress of the last 50 years this Society has played a large and constructive part, and the work that it and kindred bodies are doing is one of the most important agencies in driving away the imaginary tigers of business.

From this page the reader will get a quick picture of current business and industry. The boxed material below is a summary of the letters from regional correspondents of the American Machinist, published in full on the opposite page

IN 1880

"THERE seems to be a slight lull in the general state of the supply market this week, which is owing to a reaction of the late and sudden advance in prices. It is thought that as soon as navigation fairly opens and the weather becomes more settled, prices will be inclined to advance somewhat."

IN 1930

THE "slight lull" of fifty years ago has an echo today. The procrastination of buyers during the past several months still continues, as does the volume of inquiries, large enough to make even veteran postmen bow under their loads. A little silver is tingeing the clouds now, however, and the increase in production schedules seems due at last to be reflected in the machine-tool market.

NEW ENGLAND business is brightening perceptibly, partially as a result of aeronautical business. Canadian railroads are inquiring for tools, and metal-working production schedules are heavy. The Southern District market is very slow, although indications are favorable. Indianapolis reports some buying, but of a sporadic nature. Cincinnati manufacturers are receiving some orders for small groups of tools, and selling agents report a fair volume of orders. New York buying is better, with some high-production equipment being sold. Detroit dealers report probably the dullest conditions of any, although some plants outside that district are receiving Detroit orders steadily.

For this reason it is urged that the business men of America should take the psychologist's advice as they make their plans for the summer's trade.

The disappointment felt over the futility of the disarmament conference in London is keen. The probabilities appear to be that it will adjourn without taking any action, and that the well meant efforts that President Hoover and Premier MacDonald have made will not carry us much further toward a reduction in the world's expenditure for war vessels. It is, however, to be hoped that another effort with a similar objective will soon be undertaken, for it seems almost impossible that the world should much longer be denied an agreement which will save the lives of millions that are yet unborn, and avoid the economic and physical waste of war.

With the sole exception of the London dispatches relating to the conference, the week's news has been encouraging to business.

The tariff bill has been passed by the Senate. It still has to get through the House and the Conference Committee, but everybody seems bent upon disposing of it as promptly as possible, and it will probably become a law sooner than was anticipated a week or ten days ago. The industrialists will be the chief gainers by the changes made.

The stock market has been more active and at times quite strong under the stimulus of easy money. But the blow administered to speculation in October and November was too severe to be soon forgotten, and with 467 members of Congress to be elected in November, and a national election two years later, it seems unlikely that we shall have a repetition of the Coolidge Boom, at least in so far as its inspiration was political.

The decline in silver seems to have been halted, and at the present price of 19⅞ pence per ounce the Oriental demand is sufficient to absorb the offerings.

The steel trade is fully up to expectation, and the industry is working at 75 per cent of capacity. The fight over the proposed consolidation of the Bethlehem Steel Co. and the Youngstown Sheet and Tube Co. is attracting a good deal of interest within the industry. The proposed consolidation seems to be another effort to break down the barriers against monopoly erected under the name of the Sherman Law.

But all this is *obiter*. The sea of business is placid, it is in fact almost calm, and there appears to be no reason why the craft that navigate it should not spread their sails and hasten to the ports for which they have cleared, and in which they ought now to be able to get good return cargoes.

The reduction in our February exports is being widely commented on by some melancholy economists, but it is explained by the action of the Farm Board, and it is not to be expected that Europe will buy freely until she is convinced that Uncle Sam was not bluffing when he announced that the wheat and corn that he had recently bought were not for sale at present prices.

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THE INDUSTRIAL REVIEW

Weekly progress of the machinery and machine-tool business

THE following reports, gathered from the various machinery and machine-tool centers of the country, indicate the trend of business in these industries and what may be expected from the future:

NEW ENGLAND

New England business brightened perceptibly during the week and was given added impetus by activity from the aeronautical field. The machine-tool market is pursuing its mill-treading ways; but it is significant and gratifying that order declines have practically ceased. Sales continue to be of a routine nature, and expected improvement has simply not materialized to the extent expected. There is still a vast difference between the number of orders placed and the number of embryo orders quoted on.

Executives are confident a substantial upward trend will get under way during April. Spring expansion, however, is not likely to reach the proportions of a year ago.

Used-tool dealers are doing a scattered business with a variety of industries. Conditions however, are spotty. Buyers are determined to secure only the best units of recent models. Inquiries in this branch of the industry have declined somewhat, but are still encouraging.

CANADA

Production schedules in most Canadian machine-tool plants are holding up well and a spirit of optimism pervades the entire metal-working industry. Signs of increased second-quarter business become more and more evident. Inquiries are steadily increasing, those from the railroads being particularly heavy. Structural steel plants have considerable work on hand; locomotive plants are all working at or near capacity, and manufacturers of electrical equipment report a better demand than at this time last year.

The National Steel Car Co. reports an order from the Canadian National Railways for two oil-electric cars and four carframes, involving about $130,000. The Canadian Car & Foundry Co. has orders on hand sufficient to keep the plant working at capacity for the next three months. The Robert Mitchell Co. reports that unfilled business is now greater than for the corresponding period of last year. General Motors Corporation of Canada has received an order for 40 coaches for the Provincial Transport Co., Montreal. The Winnipeg plant of the Ford Motor Co. of Canada will be working on a schedule of 100 cars a day during April. Steel plants are well employed.

SOUTHERN DISTRICT

Anticipated sales of new and used tools for March as compared with both January and February business are decidedly favorable, and while there was no significant improvement during the past fortnight, scattered orders assisted the general machine-tool business. Most industrial plants appear slow to respond to generally satisfactory reports of business conditions throughout the country, which is reflected in cautious buying and no expansion to speak of. Anticipated activity from the Louisiana and Texas oil districts has not yet materialized, while the bringing in of oil and gas in the Jackson (Miss.) area may in time stimulate interest in this new and centrally located district.

Stagnant conditions typify the machine-tool market in practically the entire South, and only in the Birmingham district does there appear definite sign of improvement. Even this, however, is predicated on future orders from announced programs. Some buying is being done out of Mobile by the railroads, but there is relatively little inquiry from points East of this district. Prices continue to hold up well, and deliveries are reported to be better. Rainy weather has to a considerable degree curtailed construction operations.

INDIANAPOLIS

While there is little change in the machinery or machine-tool business here, the dealers and manufacturers are not entirely satisfied with present volume. Business is better than it was this time last year for some, but these manufacturers are making special tools and machinery for some particular industry that happens to be flourishing.

Those manufacturers of special machinery dealing with the construction industry are rather busy, and indications are that this will be one of the best years they have had.

A good demand also is coming for tools and equipment for the farm implement factories. Advance orders received by these factories from their branches and distributors have caused them to resume production on rather a large scale to avoid any possible shortage.

Railroads are not buying nor inquiring on the scale they did last year, but some orders are being placed. Demand for special equipment from virtually all other utilities except interurban companies, is good.

Demand from the iron and steel business continues good. Several orders of brick-making machinery have been placed in this territory. Special equipment to the stone quarries is also having a rather ready sale.

CINCINNATI

Reports of the majority of the machine-tool manufacturers of the Cincinnati district are that there has been a fair demand during the past week. There has been no change in the general market, but the prevailing opinion is that the trade trend is upward. Makers of very large tools, who report sales by the month instead of by the week, state that they had a good volume of business in March, showing a gain in the period over the previous month.

With the manufacturers the feature of the week's business was the sale of single tools, but here and there was an order for two or three pieces of equipment. The orders received were well distributed geographically and were well diversified as to sizes and types of requirements. The greater part of the buying was done by general machinists and miscellaneous users, but some small buying was done by railroads and concerns in the automotive industry.

A large number of inquiries were received during the week from various sections of the country, the greater portion being from general machinists and miscellaneous users, whose requirements were largely confined to single tools and replacements. There were some inquiries from railroads and from the automotive field, but none of these were important.

Selling agents report a fair volume of business in the week. Members of this branch of the trade state that plenty of business is developing in local and adjacent territory, and that aside from the fact that it it difficult to close deals, their market is in very good condition.

NEW YORK

The last few days of March were encouraging in the New York machinery and machine-tool market, according to dealers. Although the avalanche of inquiries continues unabated, it still carries with it but few signatures to orders. March was, however, 100 per cent better than January in most instances, and also showed considerable improvement over February. One dealer reports sales of several small groups of ultra-modern, high-production tools of a type which are comparatively expensive. Replacement and maintenance buying is still the order of the day.

"Anything we get means some good hard plugging," said one dealer in comparing the present situation with that of six months ago. The general business tone, however, is continuing its upward movement, and is expected to result in machine-tool orders within a few weeks. Railroad buying, although usually expected to be considerably greater than it actually turns out to be, is worse than usual. The D. L. & W. list, which many dealers hoped would bring in some good orders, is rumored to be dropped until next year, with the exception of a few items. Sales of tools to construction companies and to general manufacturers are practically all of single items and are the result of rather convincing sales arguments. Purchasers are procrastinating as long as possible, but prices remain as they have been, and deliveries have not changed. The used-tool market is slow.

DETROIT

While there has been no improvement in the day to day sales in the Detroit district for more than four weeks, machinery and machine-tool dealers are beginning to believe that business is on the upgrade. Inquiries are being made in increasing numbers and the impression prevails in some quarters that a fairly large number of orders will be forthcoming during the next six weeks or two months.

A number of representative dealers, however, report that they are experiencing the worst period in 15 years and that there is no prospect of improvement at present. They have had only a few scattered orders during the past two months, and these have been for replacement equipment, usually of little importance.

Throughout the field there has been little optimism of late but a better atmosphere is beginning to prevail. The automobile manufacturers are taking a more active interest in new equipment and a number of unusually significant inquiries have been sent out. This is considered an indication that a definite improvement is in sight for the machinery trade.

Even the most optimistic, however, do not look for any considerable change before May.

The general atmosphere throughout the Detroit district and the industrial sections of the state has changed little since January. There is still a great deal of unemployment, and most business men and industrial leaders frankly admit that conditions are not as favorable as they had expected them to be at this time.

THE WEEKLY PRICE GUIDE . . .

Rise and Fall of the Market

THE comparison of current shop-materials prices with those of April 3, 1880, as shown on the opposite page, reveals the fact that ten of the fourteen basic items can be purchased more cheaply in the New York market today, than fifty years ago. Refined iron bars, for instance, are 0.76c. lower, at 3.24c. per lb., than in 1880. All of the steel items are lower in price as compared with similar forms in the old-style iron. Copper, antimony, nickel are below 1880 quotations in these metals. Tin, lead, spelter, and solder, on the other hand, are noticeably higher than they were a half-century ago.

(*All prices as of Mar.* 27, 1930)

IRON AND STEEL

PIG IRON—Per gross ton, f.o.b:

CINCINNATI	
No. 2 Southern (silicon 1.75@2.25)	$17.69@$18.19
Northern Basic	19.90
Southern Ohio No. 2	19.90
NEW YORK—Tidewater Delivery	
No. 2 Southern (silicon 1.75@2.25)	19.50
BIRMINGHAM	
No. 2 Foundry (silicon 1.75@2.25)	15.00
PHILADELPHIA	
Eastern Pa., No. 2x (silicon 2.25@2.75)	21.76@22.26
Virginia No. 2	24.04
Basic	19.75@20.25
CHICAGO	
No. 2 Foundry, local (silicon 1.75@2.25)	20.00
No. 2 Foundry, Southern (silicon 1.75@2.25)	20.01
PITTSBURGH, including freight charge ($1.76) from Valley:	
No. 2 Foundry	20 26
Basic	20 26
Bessemer	20.76

IRON MACHINERY CASTINGS—Cost in cents per lb. of 100 flywheels, 6-in. face x 24-in. dia., hub not cored, good quality gray iron, weight 275 lb:

Detroit	4.50
Cleveland	5.00
Cincinnati	4.50
New York	5.25
Chicago	4.50@4.75

SHEETS—Quotations are in cents per pound in various cities from warehouse; also the mill base in large lots:

Blue Annealed*	Pittsburgh Mill Base	Chicago	Cleveland	New York
No. 10	2.10	3.35†	3.30	3.60†
No. 12	2.15	3.45†	3.35	3.65†
No. 14	2.25	3.55†	3.45	3.70†
No. 16	2.35	3.65†	3.55	3.80†
Black				
Nos. 18 to 20	2.45	3.85†	3.55	3.70
No. 22	2.60	4.00†	3.70	3.85
No. 24	2.65	4.05†	3.75	3.90
No. 26	2.75	4.15†	3.85	4.00
No. 28	2.90	4.75†	4.00	4.15
Galvanized				
No. 10	2.60	3.90†	3.80	3.80
Nos. 12 to 14	2.70	4.00†	3.90	3.90
No. 16	2.80	4.10†	4.00	4.00
No. 18	2.95	4.25†	4.15	4.15
No. 20	3.10	4.40†	4.30	4.30
No. 22	3.15	4.45†	4.35	4.35*
No. 24	3.30	4.60†	4.50	4.50
No. 26	3.55	4.85†	4.75	4.75
No. 28	3.80	5.10†	5.00	5.00

*Light plates. †Up to 3,999 lb.

WELDED STEEL PIPE—Warehouse discounts are as follows

	New York		Cleveland		Chicago	
	Black	Galv.	Black	Galv.	Black	Galv.
1 to 3 in. butt	53.74%	41.2%	55.5%	43.5%	55.5%	42.5%
3½ to 6 in. lap	50.32%	37.78%	53.5%	40.5%	51.6%	39.0%

WROUGHT-STEEL PIPE LIST

Size, Inches	List Price per Foot	Diameter in Inches—External	Diameter in Inches—Internal	Thickness Inches
1	$0.17	1.315	1.049	.133
1¼	.23	1.66	1.38	.14
1½	.27½	1.9	1.61	.145
2	.37	2.375	2.067	.154
2½	.58½	2.875	2.469	.203
3	.76½	3.5	3.068	.216
3½	.92	4.0	3.548	.226
4	1.09	4.5	4.026	.237
5	1.48	5.563	5.047	.258
6	1.92	6.625	6.065	.28
8	2.50	8.625	8.071	.277

SEAMLESS STEEL TUBING—Following net prices are for seamless mechanical tubing, cold drawn, round, .10 to .30 carbon, at New York warehouse in lots of less than 100 ft. or 100 lb:

— Thickness — B.w.g. and Decimal Fractions		Outside Diameter in Inches ¼	⅜	½	⅝	1	1¼	1½
		Price per Foot						
.035″	20	$0.15	$0.16	$0.17	$0.18	$0.19	$0.21	$0.23
.049″	18	.17	.18	.19	.20	.21	.23	.25
.065″	16	.19	.20	.21	.22	.23	.25	.27
.083″	14	.20	.22	.23	.24	.25	.27	.29
.095″	13	.21	.23	.25	.26	.27	.29	.31
.109″	12	.22	.24	.26	.27	.28	.30	.32
.120″ or .125″	11	.23	.25	.27	.28	.29	.31	.33
.134″	10	.24	.26	.28	.29	.30	.32	.34

MISCELLANEOUS—Warehouse base prices in cents per lb:

	New York	Cleveland	Chicago:
Spring steel, light*	4.50	4.65	4.65
Spring steel, heavier	4.00	4.00	4.00
Coppered Bessemer rods	6.05	6.00	6.20
Hoop steel	4.25†	4.00	3.75†
Cold rolled strip steel	6.25	6.00	6.10
Floor plates	5.10†	5.30	5.00†
Cold drawn, round or hexagon‡	3.40	3.65	3.60
Cold drawn, flat or square‡	3.90	4.15	4.10
Structural shapes	3.30†	3.00	3.10†
Soft steel bars	3.25†	3.00	3.00†
Soft steel bar shapes	3.25†	3.00	3.00†
Soft steel bands	3.75†	3.65	3.20†
Tank plates	3.30†	3.00	3.10†
Bar iron (2.75 at mill)	3.24	3.00	3.00
Drill rod (from list)	60%	55%	50%

*Flat, ¾-in. thick by ½-in. wide. †Up to 3,999 lb., ordered and released for shipment at one time. ‡Cold finished steel, shafting and screw stock.

Electric welding wire at New York warehouse— 5/32, 8.35c. per lb.; ⅛, 7.85c. per lb.; 5/32 to ⅛, 7.35c. per lb.

METALS

Warehouse Prices in Cents Per Pound for Small Lots:

Copper, electrolytic, New York			19.25
Tin, Straits, pigs, New York			38.25@39.25
Lead, pigs, E. St. Louis	5.40@5.50	New York	6.50@ 7.00
Zinc, slabs, E. St. Louis	4.85@4.90	New York	6.50@ 7.50

	New York	Cleveland	Chicago
Antimony, slabs	10.50@11.00	11.87½	14.50
Copper sheets, base	27.75	27.75	27.75
Copper wire, base	20.12½	20.12½	20.12½
Copper, drawn, round, base	26.25	26.25	26.25
Copper tubing, base	29.25	29.25	29.25
Brass sheets, high, base	23.25	23.25	23.25
Brass tubing, high, base	28.25	28.25	28.25
Brass rods, high, base	21.25	21.25	21.25
Brass wire, high, base	23.75	23.75	23.75

SHOP MATERIALS AND SUPPLIES

METALS—Continued

	New York	Cleveland	Chicago
Aluminum ingots, 99%.....	25@26	24.30	24.30
Zinc sheets (casks).....	10.75@11.25	12.25	10.11
Solder (½ and ½).....	27.50	27.50	26@28
Babbitt metal, delivered in case lots, New York, cents per lb:			
Genuine, highest grade.....			54.00
Commercial genuine, intermediate grade.....			41.00
Anti-friction metal, general service.....			31.00
No. 4 babbitt, f.o.b.....			11.00

NICKEL AND MONEL METAL—Price in cents per lb., base, f.o.b. Huntington, W. Va:

	Nickel	Monel Metal
Sheets, full finished.....	52.00	42.00
Sheets, cold rolled.....	60.00	50.00
Strip, cold rolled.....	55.00	45.00
Rods, hot rolled.....	45.00	35.00
Rods, cold drawn.....	53.00	40.00
Tubing	75.00*	90.00†
Angles, hot rolled.....	50.00	40.00
Plates.....	52.00	42.00

*Seamless. †Welded.

OLD METALS—Dealers' purchasing prices in cents per pound, f.o.b. cars:

	New York	Cleveland	Chicago
Crucible copper.....	14.75@15.25	13.50	14.00 @14.50
Copper, heavy, and wire..	13.50@14.75	13.00	13.00 @13 50
Copper, light, and bottoms	12.00@13.00	12.00	12.00 @12.50
Heavy lead.....	4.00@ 4.75	5.25	3.50 @ 4.00
Tea lead.....	2.75@ 3.00	3.25	2.50 @ 3.00
Brass, heavy, yellow.....	7.75@ 8.00	8.00	7.25 @ 7.75
Brass, heavy, red.....	11.25@11.75	12.50	10.25 @10.75
Brass, light.....	6.25@ 7.00	7.00	6.25 @ 6.75
No. 1 rod-brass turnings.	9.00@ 9.25	8.00	8.00 @ 8.50
Zinc.....	2.50@ 2.75	3.00	2.00 @ 2.50

TIN PLATES—Charcoal—Bright—Per box:

	New York	Cleveland	Chicago
"AAA" Grade:			
IC, 14x20.....	$12.10	$11.95	$11.50
"A" Grade:			
IC, 14x20.....	9.70	9.90	9.50
Coke Plates—Primes—Per box:			
100-lb., 14x20.....	6.45	6.10	7.00
Terne Plates—8-lb. Coating—Small lots—Per box:			
IC, 14x20.....	7.75@8.00	7.00	7.50

MISCELLANEOUS

	New York	Cleveland	Chicago
Cotton waste, white, per lb..	$0.13*	$0.16	$0.15
Cotton waste, colored, per lb..	.09½*	.12	.12
Wiping cloths, washed, white, per lb.....	.12½	38.00 per M	.16
Sal soda, per lb.....	.02½	.02	.02
Roll sulphur, per lb.....	.028	.03½	.04
Linseed oil, raw, in 1 to 4 bbl. lots, per lb.....	.15	.164	.152
Cutting oil, about 25% lard, in 5 gal. cans, per gal.....	.75	.60	.65
Machine oil, medium-bodied (55 gal. steel bbl.) per gal..	.33	.36	.24
Belting — Present discounts from list in fair quantities (½ doz. rolls) for leather or rubber:			
Leather—List price, 24c. per lin. ft., per inch of width, for single ply:			
Medium grade.....	30–10%	30–10%	35%
Med. grade, heavy wgt...	30%	30– 5%	30%
Rubber transmission, 6-in., 6 ply, $1.83 per lin.ft:			
First grade.....	50%	50–10%	50%
Second grade.....	60%	60– 5%	50–10%

*Grade F.

Comparative Warehouse Prices

New York	Unit	Current Price	One Year Ago
Bars, iron, common	per lb...	$0.0214	$0.0214
Bars, iron, refined .	per lb...	.0324	.0324
Angles, steel.....	per lb...	.033	.033
Tees, steel.....	per lb...	.033	.033
Bands, steel.....	per lb...	.0375	.0375
Hoops, steel.....	per lb...	.0425	.0425
Rails, steel.....	per ton...	49.80	49.80
Tin, straits.....	per lb...	.3825	.525
Lead, pig.....	per lb...	.065@.07	.085
Antimony.....	per lb...	.105	.125
Spelter.....	per lb...	.065@.075	.08
Copper, ingot.....	per lb...	.1925	.2275
Nickel, ingot.....	per lb...	.35	.35
Solder (½@½).....	per lb...	.275	.3525

MISCELLANEOUS—Continued

	New York	Cleveland	Chicago
Abrasive materials — Standard grade, in sheets 9x11 in., No. 1, per ream of 480 sheets:			
Flint paper*.....	$6.03	$6.03	$6.03
Emery cloth*.....	25.87	25.87	25.87
Disks, aluminum oxide mineral, 6 in. dia., No. 1, per 100:			
Paper†.....	2.61	2.61	2.61
Cloth†.....	4.59	4.59	4.59
Fire clay, per 100 lb. bag.....	1.00	.75	.75
Coke, prompt furnace, per net ton.....		Connellsville,	2.60
Coke, prompt foundry, per net ton.....		Connellsville,	3.50@4.85
White lead, dry.....	100 lb. kegs....	New York,	13.75
White lead, in oil.....	100 lb. kegs....	New York,	14.25
Red lead, dry.....	100 lb. kegs....	New York,	13.75
Red lead, in oil.....	100 lb. kegs....	New York,	15.25

*Less than 3 reams. †Less than 200.

SHOP SUPPLIES

Discounts from new list dated Apr. 1, 1927, applying on immediate deliveries from warehouse stocks in New York and vicinity:

Machine bolts:	
Up to ¾-in. x 6-in., full kegs, list less.....	60%
Larger, up to 1 x 30-in., full kegs, list less.....	50–10%
Less than full kegs or case lots, add to list.....	10%
Fitting-up bolts: list less.....	45%
Lag screws:	
Up to ½-in. x 6-in., list less.....	60%
Larger, list less.....	50–10%
Less than full keg or case lots, add to list.....	10%
Rivets:	
Structural, round head, full kegs, net.....	$4.50
Structural, round head, broken kegs, net.....	6.00
Tank, $\frac{7}{16}$-in. dia. and smaller, list less.....	60%
Nuts:	
Hot pressed, square or hexagonal, blank or tapped:	
Full kegs up to 1-in., incl., list less.....	60%
Larger, up to 3-in., list less.....	40–10%
Less than keg or case lots, add to list.....	10%
Washers:	
Wrought, full kegs, per 100 lb., list less.....	$4.00
Wrought, broken kegs, per 100 lb., list less.....	2.00
Turnbuckles:	
With stub ends, list less.....	20%
Without stub ends, list less.....	50%
Chain:	
Proof coil, base, per 100 lb., net.....	$8.50
Cast iron welding flux, per lb., net.....	.35
Bronzing flux, per lb., net.....	.50

MACHINE REQUIREMENTS AND INDUSTRIAL CONSTRUCTION

OPPORTUNITIES FOR FUTURE BUSINESS

IN 1880

"A large file works is talked of by a company of St. Louis capitalists, also a horseshoe factory."

"The Lenters Manufacturing Company, a new corporation in St. Louis, have embarked in the manufacture of wagon hubs."

"A new blast furnace is to be built at Kyle Slope, Jackson County, O."

"From $1,500 to $3,000 worth of machinery —iron working tools—is to be in a short time added to the works of the Stockwell Screw and Machine Co., Cleveland, Ohio, necessitating an increase of about fifty per cent in the number of hands employed."

"A new corporation was formed at Bridgeport, Conn., Feb. 9, for the manufacture of silver plated spoons, forks, etc., with a paid up capital of $75,000. Theo. D. Rogers is president."

"Rhodes & Sons, Taunton, Mass., are preparing to build an addition to their shoe button manufacturing establishment."

"An umbrella factory is about to be erected in E. 13th St., New York, 165 x 62 feet, four stories high."

"The town of Gardiner, Mass., is seriously agitating the question of constructing water works."

"Holland & Thompson, 217 River street, Troy, N. Y., claim to have produced valuable results in the combination of black lead and animal matter for lubricating machinery. In connection with its use they have invented a new squirt can, which is claimed to force out this compound, or cylinder oil, frozen lard or sperm freely, preventing loss from dripping, and the annoyance of journals heating."

"The Hendey Machine Co., Wolcottsville, Conn., are about to build an addition to their works 30 x 40 ft., two stories high. They are very busy—full of orders—but complain of the scarcity of machinists."

"Nearly the required sum for a knitting mill at Fonda, N. Y., has been subscribed."

"Nichols & Hines, hat manufacturers, have set a tubular boiler with the Jarvis setting."

"The Nashua Iron & Steel Co., Nashua, N. H., has just shipped to an Ohio river steamer a steel shaft, said to be the largest ever forged in the world. It is 28 feet 6 inches long, 13 inches in diameter, and weighs 10,990 pounds."

"The Lawrence Co., Lowell, Mass., will soon put in a 1,000-horsepower Corliss engine."

"The Western File Co., Beaver Falls, Pa., shipped eight tons of files to one firm in a single day, lately."

"A Hartford firm has become owner of a new 'multiple' telegraph system, which far outstrips the 'quadruplex' system. Paupers Vanderbilt and Jay Gould have been investigating its merits."

"The steel mill of Park Bros. & Co., at Pittsburgh, Pa., is now illuminated at night with six electric lights and the effect is said to be very brilliant."

"At the Delaney Iron works, Buffalo, an extraordinary feat in blacksmithing has been performed. A locomotive frame of the Brooks pattern was made in ten hours and forty minutes. This is said to be the fastest time on record."

"A Springfield, O., correspondent writes: The Champion Bar and Knife Co. of this city broke one of their large jack-shafts, (7 inches diameter), last week, and it will take two weeks to repair the mischief."

IN 1930

Calif., Palo Alto—C. McCall, 1404 Franklin St., Oakland, Archt., is receiving bids for the construction of a super service station here, for Firestone Tire & Rubber Co., 2525 Firestone Blvd., Los Angeles. Estimated cost $150,000.

Conn., Hartford—Superior Spring & Mfg. Co., 373 Washington St., is having revised plans prepared for a 2 story, 60 x 130 ft. factory on Washington St. Estimated cost $65,000. G. L. Dunkelberger, 721 Main St., Archt. C. Schultz, 118 Sheffield Ave., New Haven, Engr. Noted Feb. 20.

Ill., Chicago—Howe Bros., 7101 West Grand Ave., is receiving bids for the construction of a 1 story garage. Estimated cost $60,000.

Ill., Chicago — E. C. Larson & Sons, 2645 North Keeler Ave., is having plans prepared for a 2 story addition to foundry. Estimated cost $20,000.

Ill., Chicago — Perfect Parlor Furniture Co., W. Sokolowski, 1532 Elk Grove, is receiving bids for the construction of a 3 story factory at Elk Grove and North Ayes. Estimated cost $75,000. A. A. Tocha, 1200 North Ashland St., Archt.

Ill., Chicago—Teletype Corp., 1400 Wrightwood Ave., awarded contract for a 1 story, 40 x 300 ft. addition to plant for the manufacture of telegraph transcribing apparatus. Estimated cost $32,000.

Ill., Chicago — P. J. Vollman, 5635 North Sacramento St., is having plans prepared for the construction of a 3 story machine shop at Diversey and Elston Sts. Private plans.

Ill., Chicago Heights — J. Friedlander Furniture Co., J. Friedlander, 181 East 16th St., plans a 5 story addition to factory at 16th and Center Sts. N. N. I. Sosna, 185 North Wabash Ave., Chicago, Archt.

Ind., Fort Wayne—Chester Schiefer, 434-36 East Washington St., awarded contract for the construction of a service station on Lafayette St. Estimated cost $44,000.

Ind., Indianapolis—T. C. Howe, 1512 North Meridian St., awarded contract for the construction of a garage at East Washington St. and Audubon Rd. Estimated cost $150,000.

Me., Skowhegan—Central Maine Power Co., Mechanics Falls, plans to rebuild machine shop recently destroyed by fire at Wyman Dam, here. Estimated cost $50,000. Architect not selected.

Mass., Boston—W. D. Cashin Co., 35 Hartford St., is having plans prepared for the construction of a 1 story factory for the manufacture of boilers and equipment. Estimated cost $50,000. Private plans.

Mass., Quincy (Boston P. O.) — Bethlehem Shipbuilding Co., 100 Milk St., Boston, is receiving bids for the construction of 1 and 2 story boat and rivet shop buildings at Fore River ship yard. Estimated cost $40,000. Private plans.

Mass., Springfield—Norton Tire Stores Inc., C. L. Norton, 50 Hillman St., awarded contract for the construction of a 1 story, 90 x 95 ft. service station at Westminster and State Sts. Estimated cost $45,000.

Mass., Westfield — Finance Commission, City Hall, is receiving bids for the construction of a 3 story, 75 x 180 ft. boys trade school including manual training department. Estimated cost $175,000 to $200,000.

Mass., West Roxbury (sta. Boston) — Park Dept., will soon award contract for the construction of a 1 story garage and repair shop at Franklin Park Yard, here. J. M. Gray and J. P. Hefferman, 175 High St., Boston, Archts.

Mich., Detroit — Weston & Elington, 1507 Stroh Bldg., Archts. and Engrs., will receive bids about Apr. 9, for the construction of a 2 story, 100 x 242 ft. factory and office on Fort St. for Electrograph Co., 725 West Grand Blvd. Estimated cost $160,000.

Mo., Kansas City—National Garage Co., 1220 West 62nd St., awarded contract for the construction of a 6 story, 115 x 156 ft. garage at 11th and McGee Sts. Estimated cost $150,000.

Mo., North Kansas City—G. Totman, 1201 East 22nd St., plans the construction of a 1 story garage at 18th and Swift Sts. Estimated cost $30,000.

N. J., East Orange—W. F. Bower, 437 Main St., Archt., is receiving bids for the construction of a 2 story garage and service station at North Union Ave. and Commonwealth Pl. for Essex County Mortgage Co., 364 Main St. Estimated cost $150,000. Noted Mar. 20.

N. J., Elizabeth—John Skramovsky, 51 Dayton St., is receiving bids for the construction of a 1 story, 50 x 100 ft. work shop at 10-18 South Spring St. Estimated cost $40,000. J. B. Beatty, 15 North Reid St., Archt. Noted Mar. 13.

N. J., Kearny — Western Electric Co. Inc., O. C. Spurling, Ch. Engr., Lincoln Highway, is receiving bids for three 7 and 8 story, 105 x 235 and 175 x 475 ft. factory buildings on Central Ave. Estimated cost $500,000. Private plans. Noted Jan. 30.

N. J., Linden—Commercial Steel Equipment Corp., 1024 Elizabeth Ave., will build a 1 story factory. Estimated cost $40,000. A. J. Silberstein, 868 Broad St., Newark, Archt. Work will be done by separate contracts.

N. J., North Bergen—Township Commission, Municipal Bldg., will receive bids about May 1, for the construction of a 3 story, 90 x 110 ft. garage, signal station, etc. Estimated cost $150,000. R. B. Glenn, Municipal Bldg., Archt. and Engr.

N. Y., New York—Bristed Estate, 784 Park Ave., plans the construction of a 4 story, 16 x 75 ft. garage at 50 Downing St. Estimated cost $50,000. F. E. Vitolo, 56 East 45th St., Archt.

N. Y., New York—Sobel Bros., 5th Ave. and 110th St., will receive bids about Apr. 20, for the construction of a garage and service station at St. Nicholas Pl. and 150th St. Estimated cost $40,000. Noted Mar. 27.

Pa., Bradford—Richerson & Pryde Inc., 4 Boylston St., is having plans prepared for the construction of a 3 and 4 story service station at 50 East Main St. Private plans.

Pa., Johnstown — Motor Sales Co., Valley Pike and Central Ave., awarded contract for a 2 story, 60 x 124 ft. sales and service building on Valley Pike. Private plans.

Pa., Pittsburgh — Lake & Davidson, Negley Bldg., Archts., are receiving bids for the construction of a foundry and office for Reliance Steel Castings Co., 28th and Smallman Sts. Noted Dec. 26.

Pa., Pottsville—Yuengling Realty Co., 5th and Mahantooga Sts., is having preliminary plans prepared for the construction of a 3 story garage at Norwegian and 5th Sts. Estimated cost $200,000.

Pa., Uniontown—Turner Auto Co., P. A. Seeman, 261 East Fayette St., is receiving bids for the construction of a 1 story, 60 x 100 ft. garage. Bartholomew & Kirchenbower, 1107 Keenan Bldg., Pittsburgh, Archts.

Pa., Warren—Pennsylvania Furnace & Iron Co., H. A. Crary, Pine St., awarded contract for the construction of a 1 story, 68 x 200 ft. shop building.

Pa., York — York Hoover Body Corp., Belvidere and Linden Sts., is receiving bids for the construction of a 2 story factory on Wheatfield St. Estimated cost $30,000. W. H. Swartz, 515 Prospect St., Archt.

Tex., Beaumont—International Creosoting & Construction Co., Pine and Long Sts., plans the construction of a storage plant, also two or more tanks, 17,000 bbl. capacity for storing creosote. Private plans.

Va., Richmond—American Can Co., 230 Park Ave., New York, N. Y., plans the construction of a can manufacturing plant, here. Estimated cost $1,000,000. Private plans.

Ont., London—Sparton Co. of Canada, plans the construction of a plant for the manufacture of radios and warning signals.

Ont., Peterborough—Canadian General Electric Co., Park St., awarded contract for the construction of a 1 story, 160 x 400 ft. plant for the manufacture of switchboards. Estimated cost $175,000.

Ont., Sandwich—Cadwell Sand & Gravel Co., 228 Sandwich St., plans the construction of a 44 x 133 ft. machine shop. Estimated cost $30,000. Private plans.

Ont., Toronto — May Oil Burner Co., 3500 East Biddle St., Baltimore, Md., plans the construction of a plant, here.

Ont., Toronto — J. F. Raw Co. Ltd., 56 Adelaide St. E., awarded contract for the construction of a 5 story blue printing plant, instrument factory, etc. at Richmond and Church Sts. Estimated cost $100,000. Noted Mar. 20.

Ont., Walkerville—Canadian Bridge Co. Ltd., Walker Rd., plans the construction of a 1 story, 240 x 310 ft. addition to factory for steel transmission line tower manufacture. Estimated cost $100,000. Private plans.

Que., Hull — Hydraulic Jack Co., R. W. Helmar, Pres., Sherman, N. Y., plans the construction of a plant, here.

Que., Roxton Pond—Napoleon Racine, plans the construction of a sash and door factory. Estimated cost $25,000.

C. Z., Coco Sola—Bureau of Yards & Docks, Navy Dept., Washington, D. C., awarded contract for a storehouse and engine overhaul shop, here. Estimated cost $240,000.

Cuba, Havana—Continental Can Co., 1 Pershing Sq., New York, N. Y., plans the construction of a new can manufacturing plant here equal to present plant now in operation. Estimated cost to exceed $1,000,000.

Mexico, Pedras Negras—C. M. Bress, Pedras Negras and Eagle Pass, Tex., plans the construction of a plant for the manufacture of containers for lard in connection with lard refinery, here. Estimated cost $45,000. Private plans.